The
Electrical Review

VOL. CXI. OCTOBER 28, 1932. No. 2866.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central **5871 (5 lines).**

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to E.R. (1930) LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Principal Contents:

	PAGE
Training Engineers	625
Electricity in the "Talkies"	627
Electric Haulage on Canals. By R. Hedley	628
Multiple Earthing. By William T. Taylor	630
The Norwich Extension	632
Beckenham Town Hall	633
Induction Regulators. By V. C. Bryan	634
A Large Motor for India	635
New Hope for the Deaf. By C. M. R. Balbi	636
Meetings and Discussions	637
Correspondence:—Domestic Four-wire Services; Electricity and Shipping; Tobacco Curing by Electricity; The Hotel Lighting Campaign; Conduit in Breeze and Clinker Concretes	639
New Apparatus and Devices	641
Let the Sales Manager Manage!	644
Business and Industrial Notes	646
Electricity Supply	650
Traction	652
Communications	652
Contract Information	653
Notes	654
Our Personal Column	655
New Companies Registered	656
Returns of Electrical Companies	656
City Notes	657
Stocks and Shares	657
Published Specifications	659
New Work for Contractors	660

Training Engineers

THE most valuable part of Professor Marchant's presidential address to the Institution of Electrical Engineers was, we thought, that which dealt with the training of electrical engineers. His long experience of technical education confirms the belief, often stated in these columns, that early specialisation is a mistake.

There is nothing in this view to prevent a boy, while still at school, from forming a general idea of what calling he will ultimately adopt; thus, if his natural bent be engineering he will not spend time on classics. But a too-early concentration on vocational work may be at the expense of acquiring an adequate general education, deficiencies in which may later prove a handicap even in his professional career.

Early specialisation limits the positions open to a youth, and in the higher offices his engineering training becomes very largely a background to efficient administration for which a man who is devoid of wider technical resources may be unsuitable.

In view of the rapid development of our industry, electrical work especially calls for a mentality that is receptive of, and capable of adapting itself to, new methods, and this flexibility may be acquired by a broad-based education.

Mr. C. C. Paterson has said that the scope of electrical science doubles itself about every ten years. How much of the specialised knowledge that engineers gained at college, say, twenty-five years ago is of practical use to them now? Very little; hardly anything but fundamental theory remains. They have had to teach themselves as they went about their daily work. That shows how very much more technical training implies than memorising facts out of books. It is the method used by our professors in teaching us how to make use of knowledge that counts. A man cannot learn too much, provided he can assimilate what he learns. Knowledge is a tool and in his ability to exploit it to the full lies the test of the engineer.

We have heard this week, at the I.E.E., the Institute of Fuel, and at the Old Faradians' reunion, of the need to encourage research. Research is useless unless the engineer is so trained that he is mentally equipped to draw appropriate deductions from it. We believe that the ability to do so is far in excess of the provision made for research at the present time, but appreciation of this is often lacking; this may be owing to a mistrust of our power to apply our knowledge, but it is also due to a lingering belief in the superiority of rule-of-thumb methods that ill becomes an industry that is founded upon physics.

Yet the old idea that an ounce of practice is worth a ton of theory is not without an element of truth. But if we regard the principal end of scientific training as the development of initiative and thinking power, as Professor Marchant suggests we should, then we shall discover for ourselves the truth of the epigram of Dr. Eccles that an ounce of theory will produce a ton of practice.

Next Year's Convention

THERE is no need when the subject of a national electrical convention comes under further consideration at E.D.A. for any question of an *annual* event to be discussed. What we have advocated is the holding of a united effort *next year* for the express purpose of celebrating the "completion" of the grid and giving electricity a general boost in the mind of the public. In many directions the opinion is strongly held that such a break-away for once would do us all good. Further, any idea that all the long-standing differences between the respective sections of the industry must be settled before we can plan a united gathering *at which none of those differences need be discussed* should be washed right out. There never will be any convention of the industry if we are going to wait for everybody to see eye to eye concerning details. Surely, there can be a general fraternisation and propaganda effort to secure the end which all should have in view—a more rapid growth in the use of electricity for all purposes! If the general convention of 1933 failed to fulfil expectations there could be a return to separate con-

ventions in 1934. The call is for individual prejudices and ambitions to be suspended while the interests of the whole industry have a chance.

Simplex Developments

For very many years the word "Simplex" has been well known to the electrical trade. First used to describe a particular make of steel conduits and fittings for installation work, it has now taken on a much wider application, and the organisation which has just been established as the Simplex Electric Co., Ltd., will be responsible for the distribution of a large range of products, among them domestic and lighting appliances which are known by the name of "Creda" and "Credalux," and conduits and fittings of "Simplex," "Stella," and "Perfecta" makes. It is hoped by this co-ordination to improve production and to speed up and extend the companies' service.

A Notable Broadcast

Hearty congratulations are due to Mr. A. P. Young, of Rugby, for both the manner and the matter of his broadcast statement of Saturday last. Millions of listeners at home and abroad heard him tell of an unparallelled piece of electrical engineering work carried out in record time by the British Thomson-Houston Co., under an order from the Tata Iron & Steel Co. for its Jamshedpur works, for which there had been keen world competition. We remarked a week or two ago that electrical affairs seldom get a hearing across the ether, but Mr. Young was able to describe the efficient and expeditious handling of the planning, production and transportation of a gigantic rolling-mill motor in such a way as to capture the interest of the average listener both at home and abroad. Very concisely he gave an insight into the orderly way in which, immediately after the cabled order was received, minds, material and equipment were concentrated upon the special task of producing this great machine well within the specified time. His account of the plans for securing a clear way for its transportation on Sunday over the railway to the docks for shipment was equally impressive and interesting. The "story" must have been encouraging to all who take a pride in British industry, and it was an effective means of letting the world at large know that in design and in economic and rapid production Britain's electrical engineers can hold their own against all comers.

Good Work!

The dispatch of this huge motor, 26 ft. in diameter and 22 ft. 10 in. long, seven weeks after the receipt of the order is a credit to the Rugby organisation. While the steel makers helped by delivering raw materials promptly, it is, nevertheless, significant that this large machine has been "fabricated" throughout. This method of construction, which was initiated by the British Thomson-Houston Co., Ltd., in this country in 1926, reduces weight and avoids the delay of waiting for patterns and castings. The only castings in this machine are its pedestals and bearing liners. This new synchronous machine is to take the place of the induction motor which has hitherto driven the steel mill. It will provide more power to enable larger stock and greater tonnage to be rolled, and quick delivery was essential to minimise the change-over time. The low constant speed of the synchronous machine will enable it to drive the mill direct, thus eliminating speed-reducing gear, while at the same time maintaining any desired power factor without employing relatively expensive phase-advancing equipment. Its larger air gap and simpler rotor construction should also minimise the likelihood of breakdown.

Spend Your Money Wisely!

The unwisdom of drastic cutting down of expenditure upon employment-making and profit-producing electrical work has been so often stressed here during the past year that it ought to call for little further emphasis now. Yet it is the duty of everybody to face up to his responsibilities and to exceed them while the economic situation continues in such deep depression. The "wise-spending" campaign now in progress is designed to induce all who can afford to make work for other people to do so between October and March. If every electrical undertaking will put its full weight into a campaign among non-consumers it will make new work for electrical contractors and wiremen, and cause sales of apparatus which will increase employment in the factories. If every electrical consumer with a few pounds to spare will add to the lighting and power points and appliances in his household much bigger business will be done, with all-round advantage. Wise and courageous expenditure by private citizens who can afford it is an obligation which must not be avoided. Even electrical men should add to their own installations!

Light— and Heat

Adequate illumination carries with it as a by-product the emission of heat, which often serves a useful purpose in eliminating moisture. During a recent visit to the Gaumont-British Studios we found that a film of "The Midshipmaid" was being "shot." Mr. Stanley Templeman, the electrical engineer, told us that some 350 electric lamps were being used to give the effect of tropical sunshine on the deck of the "battleship"; these included 300-A arc lamps and 5-kW incandescent lamps, and gave a total load of 10,000-A at 125 V. The "sunshine" was made more realistic by the accompanying temperature, which rose to 128 deg. F. on the set.

Take the Initiative!

Speaking at the annual dinner of the Faraday House Old Students' Association, Sir Hugo Hirst said that he is more hopeful now of the future of electricity than ever before in his fifty years' connection with the industry. He believes that we are only at the beginning of immense developments. The evolution of the gas discharge lamp (which will enable us to sell light as such), the controlled-grid rectifier, the photo-cell, and the eager requests for co-operation being received from the architects are only a few of the promising ways in which electrical prosperity may be found. But if electricity is to come into its own it is our duty, as Sir Hugo reminded us, to take the initiative in showing the public how electricity can be helpful; we must not wait until the electrically ignorant consumer asks for our help. The first step is to acquaint ourselves with everything electrical that the manufacturer has to offer. The next is to study the requirements of the consumer and to show him where and how the apparatus can be used with the least consumption of energy.

More 33-kV Alternators

The two 30,000-kW alternators for the new Tir John power station of Swansea Corporation are to be wound for 33 kV. The recommendation of Mr. J. H. Rider is in accord with the tendency to regard the production of electricity as having no relation to local government boundaries. There are other advantages than the avoidance of transformer losses and the saving in space due to the direct connection of the alternators with the 33-kV grid system. With large-scale generation the problem is often not so much one of voltage drop as of getting the load out of the station; the need to reduce the number and size of cables calls for higher voltages for even quite short transmission distances. By their courage and foresight in putting forward a 33-kV stator for one of the Brimsdown machines, Messrs. C. A. Parsons & Co. have staked out the claim of Great Britain as the pioneer in high-voltage generation. The success of the Brimsdown machines was rewarded by an export order for a 33-kV set for Cape Town, and now comes the Swansea contract to give further encouragement to manufacturing enterprise.

Electricity in the "Talkies"

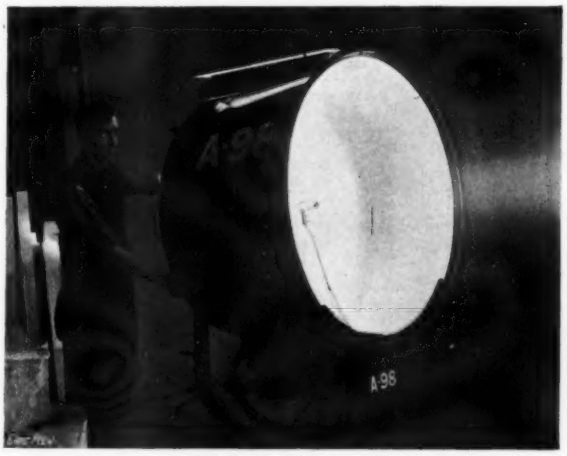
The Gaumont-British studios at Shepherd's Bush

THE reconstructed and extended studios and offices of Gaumont-British Picture Corporation, Ltd., at Shepherd's Bush, London, W., provide an excellent example of the favourable conditions under which film production is now taking place in this country. Supply is taken from the mains of Hammersmith Corporation at 6,600 V three phase 50 cycles and transformed to 415 V by two 1,500-kVA Hackbridge transformers (controlled by Statter switchgear), both of which are kept in commission. There is also a 2,200-V single-phase feed from the mains which is transformed to 230 V by a B.E.T. transformer, also equipped with Statter switchgear, for office lighting, &c.; this installation can be fed from the three-phase system.

The studio and stage lighting is at 120 V d.c., which is obtained from four 125-kW and two 250-kW E.C.C. motor generators. Nos. 3 and 4 were originally installed in 1915 with 185-h.p. single-phase motors, said to be the largest of the type built at that date. They gave unfailing service and were rewound in 1931 for three-phase operation. All the generators are shunt-wound and bare copper rod is extensively used for connections, corded as protection against shock where necessary. This makes a neat fire-proof job and is considerably cheaper than using v.i.r. cables.

A Heavy D.C. Load

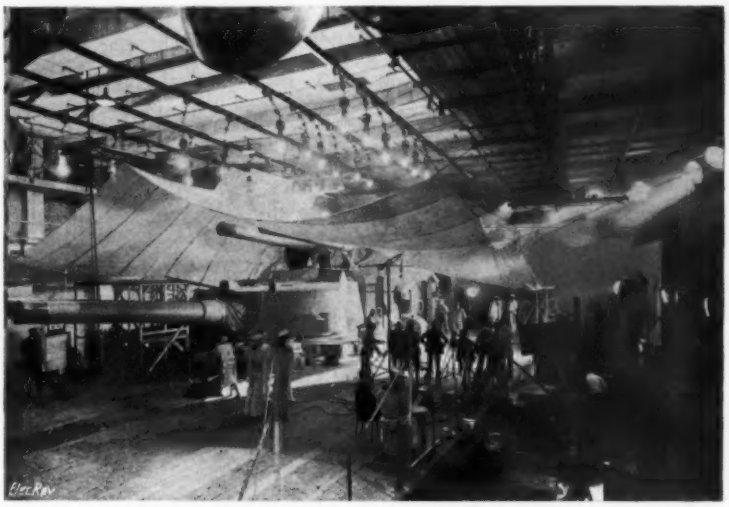
The d.c. maximum demand is 10,000 A. The seventy d.c. circuits are controlled from fourteen panels which were designed and constructed by the studio engineering staff, who also built the switchboards controlling the twenty-seven three-phase 415-V circuits and the 230-V forty-circuit house-lighting panels.



A 300-A "sunlight" arc

An interesting feature of the sub-station is the provision of two 5-kVA 50- to 48-cycle frequency changers (motor alternators) supplied by the E.C.C. These machines maintain synchronism between the recording machines which are driven at 1,500 r.p.m. and the picture cameras which are driven at 1,440 r.p.m.; this is accomplished by driving them with synchronous motors operating on the 50-cycle and 48-cycle supplies respectively. The camera motors could be driven by 50-cycle synchronous motors, but this would necessitate gearing each one down in the ratio 1,500/1,440 on each motor. This method has the disadvantage of increasing the noise—a very disagreeable feature in a sound-film studio.

The lack of head-room in the sub-station prevents the use of cranes and considerably complicated the work of installing the plant. This would also introduce difficulties if the maintenance of the heavier plant were considerable, but conservative ratings and other precautions have reduced this to the minimum. The layout of the plant had to conform to space limitations, but, as will be seen from our picture of the sub-station (p. 629), the best has been made of the circumstances.

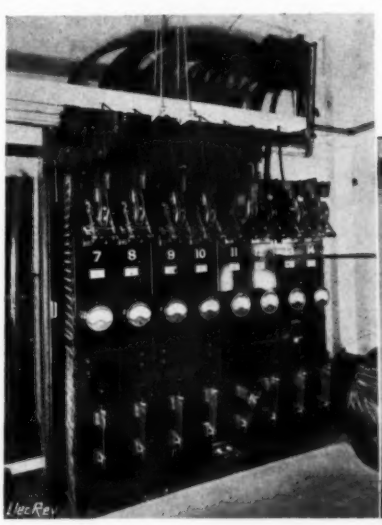


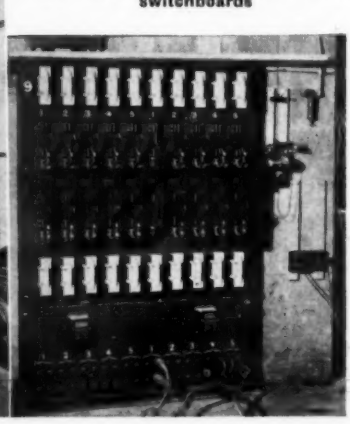
Filming "The Midshipmaid" by the light of 350 lamps

At one time even a slight fog penetrating the studio would make it impossible to continue production owing to the beams of light from the hundreds of lamps used on the sets, but nowadays the atmosphere is kept crystal clear by means of a Hall & Kay air-filtering and heating plant, operating on the plenum principle. The air intake is by way of the filters situated on the roof 90 ft. above ground level and the air is propelled by two large fans rope-driven from two Brittain motors, one of 15 h.p. and one of 25 h.p. It passes through steam heaters and enters the studios at ceiling level. The mechanical parts of the system and the air inlet speed to the studio are so designed as to give practically silent operation. In the basement there is also an "Aerograph" compressor which is used to supply compressed air for the paint sprays in the studios and also for cleaning the camera equipment.

Distribution in the Studios

In each of the six studios there is a distribution board (by the Westwood Manufacturing Co.) connected with the sub-station by 0.85 sq. in. feeders. At the bottom of the boards are sockets into which the heavy portable c.t.s. leads can be plugged for providing current to any part of the studios. Branch circuits can be tapped off the main portable leads by the use of 300-A portable plug-connecting boxes. The cables throughout are of either Hackbridge or Johnson & Phillips manufacture.





(Left): Master board for studio lighting; (Right): One of the studio switchboards

There are five hundred studio lighting units, both incandescent and arc lamps. The incandescent lighting includes lamps of from 1.5 to 5 kW in capacity, the housings of which are mostly fitted with Parsons parabolic reflectors varying in size from 12 in. to 36 in. These lamps were supplied by the Kandem

Electric Haulage on Canals. By R. Hedley

Ninety miles on the Rhine-Rhône system

THE accompanying illustrations show a typical section of the Rhine-Rhône canal the electrification of which was carried out under the auspices of the Office National de la Navigation, of Paris. Starting at the autonomous port of Strasbourg, the canal has been electrified as far as Mulhouse, with lateral canals to Colmar and Hueningen (near Bâsle), respectively, a total of about 90 miles.

The track is of 2-ft. gauge; the rails weigh 35 lb. per yd.; the fir sleepers are spaced at 32 in. The rail nearest the water edge has an elevation of $\frac{3}{4}$in. over the other in order to increase the stability of the locomotive. The trolley line is designed to form an aerial ropeway for the collector carriage, which comprises two grooved pulleys in tandem. The flexible cable leading to the locomotive is fitted with an automatic clip which severs the connection and thus avoids damage due to careless driving at certain points of the route.

Brackets bolted to lattice girder masts suspend the trolley wire at a normal height of 15 ft. above the ground and about 5 ft. from the track centre. Two alternative methods of crossing tram lines are employed: (1) The trolley line of the canal railway is carried above that of the tramway, the two wires being separated by porcelain insulators; or (2) it is interrupted for a distance of about 13 ft., the two ends being formed into catch points for the collector carriage. On arrival at the crossing, the driver uses an insulated pole to lift the collector carriage off one end and replace it on the trolley wire at the other end. Underneath some of the bridges the trolley wire drops to just about 6 ft., and is carried in wooden channels in order to prevent accidental contact.

The Locomotives

The locomotives are of the four-wheeled type and weigh six tons. The length over buffers is 14 ft. 9 in.; maximum width, 3 ft. 6 in.; wheelbase, 4 ft.; and diameter of driving wheels, 2 ft. 7$\frac{1}{2}$ in. One 16.5-kW, 500-r.p.m. traction-type motor drives the front axle through a double reduction gear. The rear axle is coupled by means of a roller chain running in an oil bath and adjustable for correct tension. Four coiled springs support the weight of the frame, which is built for heavy plates. The haulage rope is attached to the locomotive through a spring loaded draw hook of the swivelling type; a simple trigger device operated from the cab allows the cable to be detached from the hook. Both the hand-operated brake and the sanding apparatus act on all four wheels. A warning gong and electric head and tail lights are fitted.

The railway is worked from sub-stations fed from four power stations situated respectively at Strasbourg, Sélestat, Mulhouse and Guebweiller. Each sub-station is equipped with two sets of 150-A, 600-V mercury-arc rectifiers.

The barges on the Rhine-Rhône canal carry from 250 to 300 tons. The maximum draw-hook pull is 1,100 lb. at a speed of 2.5 m.p.h. On the Hueningen section of the canal, where the flow of the water is particularly swift, the pull on the haulage cable is about 35 per cent. higher, whilst the speed is a little over 2 m.p.h. The work was carried out by the Allgemeine Elektricitäts Gesellschaft.

The track passes under a bridge

Left: A typical section of the Rhine-Rhône Canal. Right: A locomotive, showing the collector

Electricity in the "Talkies" (*Concluded from preceding page*)

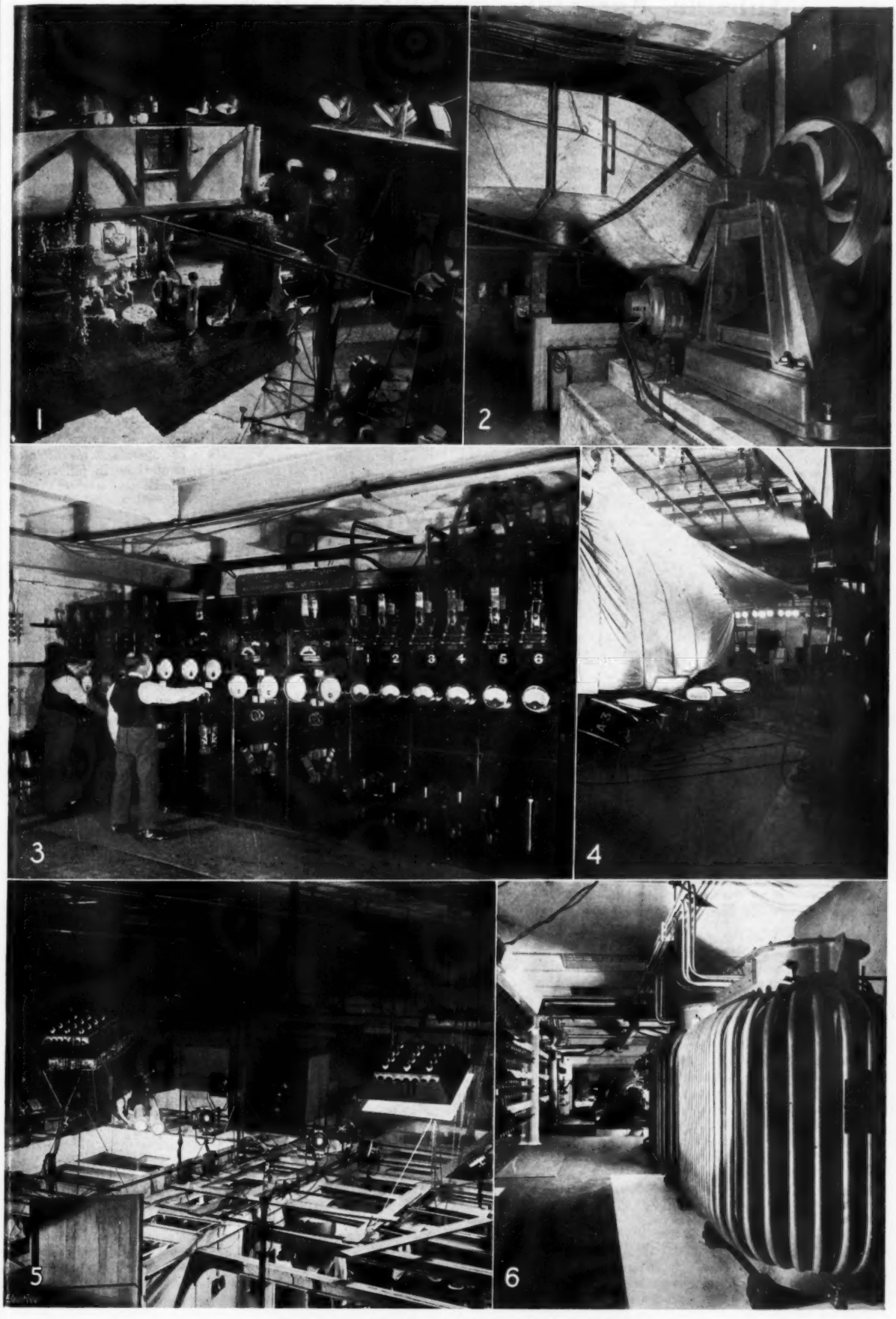
Electrical Co., the General Electric Co., Ltd., and the British Thomson-Houston Co., Ltd. The Kandem arc lamps comprise 40-, 80-, 150- and 300-A projection units, and are fitted with facet and parabolic mirrors 300 mm., 500 mm., 700 mm. and 1,000 mm. in diameter, supported on steel scaffolding. The top lamps (50-A) are used chiefly for exterior lighting effects. The effect of commutator ripple is smoothed out by the insertion of choking coils (designed in the studios) in series with each arc lamp; these chokes were made by Messrs. Brittain's.

Synchronising the Cameras

Another outstanding electrical feature in the production of motion pictures is the use of the interlocking synchronous motor system. This is used in connection with the "projected background" process, in which it is necessary to photograph a background which is projected from a specially adapted cinema projector. As the principle of motion picture photography and projection involves the use of intermittent movements, whereby the film becomes stationary in the lens system at a rate of twenty-four "frames" per second, these movements, on the background projectors and the cameras rephotographing them, must be synchronised; this is done by using interlocking motors supplied by Small Electric Motors, Ltd. The stators of these motors are excited by a 230-V single-phase supply and the rotors are all connected in parallel.

On one of the projection machines is a master synchronous motor of the ordinary type which is capable of driving, through the medium of the torque motors, all the other projectors or camera motors used in the particular "shot"; the procedure is to set the shutters of the projectors and cameras so that they are all in step, *i.e.*, open or closed at the same time, and then to interlock the motors by switching on the 230-V field supply. After this, it is only necessary to start up the master synchronous motor and all the other machines keep in step.

During our recent visit to the studios we saw the filming of scenes for "The Good Companions" and "The Midshipmaid," two forthcoming productions, and were permitted to take photographs of some of the sets, two or three of which we reproduce.



At the Gaumont-British Studios, Shepherd's Bush

1. Filming "The Good Companions." 2. The fog-dispersal plant. 3. The d.c. switchboard in the sub-station. 4. Producing "tropical sunshine." 5. Behind (and above) the scenes. 6. The main sub-station; motor-generators in the background.

Multiple Earthing. By William T. Taylor, M.I.E.E.

Its merits for safety, economy, and efficient operation

THE practice of earthing the neutral at one point, *i.e.*, at the supply end or sub-station *only*, has not given best all-round results under normal or abnormal current and service conditions. Service is found to be less satisfactory the greater the length of neutral return and the smaller the cross-section of neutral conductor compared with that of the phase conductor.

Experience gives ample proof that it is practically impossible to hold every part of a distribution network at a constant minimum neutral voltage to earth and provide good voltage regulation where the common sizes of neutral conductors are employed for single-phase lines when operating at or near full load. A system of multiple earthing spread over the whole distribution system (so that respective circuit impedances are placed in multiple) will reduce the total series impedance of the various return paths during heavy load or short-circuits and will ensure that the consumers' earthed circuits are maintained at the lowest possible potential even under the worst possible conditions, such as a metallic contact between primary and secondary phases, or lightning charge.

Earthing the primary neutral (h.v. or supply side) increases the reliability of transformers and lines, and decreases the costs of the apparatus, at the same time limiting potential stresses on transformers, line insulators, &c. Still more important results are secured (particularly with overhead lines) when both the primary and secondary step-down transformer (or secondary step-up and secondary step-down) neutrals are effectively earthed. In Fig. 3 it is shown that under abnormal operating conditions the stresses to which the whole system insulation may be subjected in service, and the danger of breakdown of insulation due to contact between primary and secondary, or the effects of arcing earths, lightning, switching, short-circuits, &c., is definitely limited to the absolute minimum at the earthing points, and that it is *impossible* to maintain this condition on consumers' premises in any other way than by multiple earthing.

Single Earthing Practice

With a single earth at the distribution supply end only, the best service can be expected when: (*a*) single-phase loads are so connected that phase balance is secured; (*b*) single-phase circuit lengths and loads are kept well within good-service limits; (*c*) transformers for single-phase loads are given the right system connections; (*d*) the neutral-return conductor is of ample cross section, *i.e.*, not less than the size of phase conductor; and (*e*) the phase conductor (or conductors) is carried throughout in the same relation to the neutral return conductor. Apart from the transformer connections, which vary, and the size of neutral return conductors, which are usually no more than 60 per cent. of the phase conductor, single neutral-earthing practice has more or less complied with these requirements. But multiple earthing of the secondary (l.v.) provides the best solution of this problem and it offers a more reliable, better, cheaper, and safer service, with the additional advantages of employing a much smaller gross total section of distribution neutral-return copper conductor and more effective earth stratum.

From the consumer's standpoint four specially important advantages of multiple earthing are: greater safety, *i.e.*, much less danger from shock; increased protection for equipment and entire installation; improved service and better lighting; and fewer complaints and lamp burn-outs. This method of operation has also the advantage of maintaining a resultant minimum earth resistance (due to the distributed multiplicity of earths connected in parallel) which is of great importance in the reduction or complete elimination of system potential gradients and dangerous foreign induced potentials, both of which may be harmful to the consumer or the installation.

Mr. W. T. Taylor

For the usual three-phase distribution transformer ratio of 11,000 to 400/230 V, and system transformer connections shown in figs. 1, 2 and 3, we may subject the secondary l.v. system to the following voltage stresses, depending on whether we earth the system as in figs. 2 and 3, or operate with isolated neutral as in fig. 1. For the isolated neutral system (fig. 1) the most serious danger from faults occurring in the system itself (neglecting external and internal abnormal phenomena) is a cracked line insulator or transformer bushing (x_1), and insulation breakdown between primary and secondary or crossed primary and secondary line conductors (*e*) which apply to figs. 2 and 3, with accidental earth on the secondary. Thus, for fig. 1, if the impressed primary voltage BC, AC and AB is 11,000, and *bc*, *ac* and *ab* is 400, the potential difference between the secondary l.v. and earth on one side is 'over twenty-eight times the normal secondary voltage between phases. And for the earthed (primary) neutral system (see fig. 2) the potential is over sixteen times normal secondary voltage between phases. But in the case of a system with earthed primary and secondary neutrals (shown in fig. 3) the maximum potential is less than normal secondary voltage between phases, *i.e.*, 0.5 times only. Effective multiple earthing on consumers' premises best maintains this value *always*. We thus see that fig. 1 is subjected to a secondary voltage to earth over 49.00 times that of fig. 3, and fig. 2 to over 29.00 times that of fig. 3, which surely gives ample evidence why every electricity authority should employ the method of earthing the system shown in fig. 3.

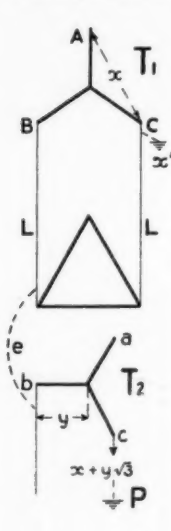


Fig. 2

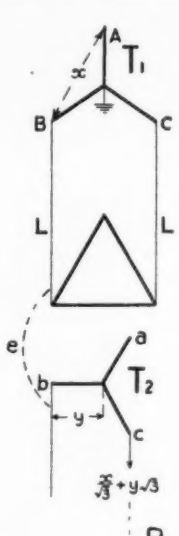


Fig. 1

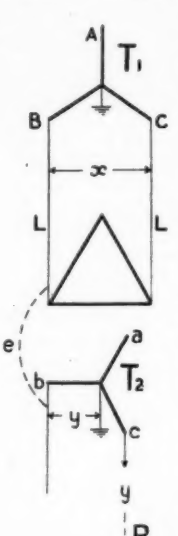


Fig. 3

T_1, Generator or step-up transformer; T_2, step-down transformer; LL, leads to transformer or transmissionline; P, person or installation

Effective multiple earthing of the secondary neutral-return conductor offers the best security to the consumer and a very low evenly distributed resistance not obtainable in any other way. The safest place is at (or as close as possible to) the point protected by effective earthing, which with present day practice is remote; hence the endless controversy. The better the consumer's neutral earth connection and the closer it is to the supply end or/and the closer the actual appliance or installation requiring protection is to the earth connection, the greater the safety and the lower will be the return resistance (which is of itself a most desirable protective measure for relays, &c.), the less the voltage drop, danger, and the number of lamp burn-outs.

Earthing at the Sub-station Only

Where a single neutral-earth is made at the supply end only, the entire distributor and service lead from the transformer to the consumer's premises can be taken as part of the farthest consumer's supply and has so-called "protection"; as such a condition involves the longest length of neutral return over a relatively very small copper section, compared with the multiple-earthing condition, the whole distribution system constitutes not only an inferior protector but also a much less effective load-voltage stabiliser. Moreover, the resistance (or impedance) and voltage drop of the return circuits up to the single earthed-neutral at the supply end may be higher even when greater copper cross section is employed in the many individual neutral return

circuits compared with the whole multiple-earthed system employing less copper in earthed return circuits. As continuity of the earth stratum varies according to the geological formation, &c., the earth connection at the supply end may *locally* be all that is desired, but it may be very ineffective at the consumer's end, where, for instance, the earth connection merely enters a non-continuous pocket of moist clay cut off or surrounded by dry sand or other high-resistance earth. And as this latter condition is the too common argument against earthing on consumers' premises, we see the advantages of doing so.

The control of single-phase load is entirely in the hands of consumers and, where single-phase supply is taken from three-phase service, it is not unusual (in the case of single neutral-earthing at the supply end only) to find that the resultant current flowing through the neutral conductor gives rise to an excessive drop in the voltages of a loaded phase and at the same time an excessive pressure rise on the unloaded (or lightly loaded) phases. Loss of revenue occurs on the one hand and complaints and lamp burn-outs on the other. The best and most economical solution for such a defective service is to effectively multiple-earth the neutral conductor on consumers' premises, or alternatively, to increase the total sizes of neutral conductor to (most probably) a commercially prohibitive amount.

System Disturbances

The closer together the effective neutral earth-connections are placed, the lower and more uniform will be the system voltage-gradients likely to exist in any definite length of circuit. Conversely, for an extensive three-phase distribution system involving circuits of great length and single-phase loads aggregating hundreds of kVA, all emanating from one sub-station or from one transformer (with a single earthed neutral), somewhere out on the system a high current in the neutral may be recorded, perhaps ten times greater than if the neutral of individual circuits had been earthed at a multiplicity of points. Furthermore, a multiplicity of earth connections on a neutral return overhead line-conductor circuit is of very great value because of its tendency to reduce the lightning hazard on all the phase conductors located on the same overhead line. With this method the induced lightning charge is reduced in the first instant and is readily dissipated before it can reach the supply end where costly apparatus is located; whereas, the same line with single neutral earth at the supply end only may endanger the station and other apparatus, by first receiving a much more dangerous lightning charge and then drawing it toward the only discharge point provided.

When earthed at the supply end only, the breaking of the neutral conductor (of the main or distributor or service-lead return) out on the line may introduce a very serious hazard, in that there will be no indication of the break at the transformer or point of supply. The line will not trip out and the broken conductor may be so placed as to produce a voltage to earth equal to the phase conductors and thus be a real source of danger until the fault is remedied. The best and safest solution to this problem also is to earth the neutral at definite intervals out on the line, but preferably on consumers' premises, so as to give better service and maintain safe neutral-to-earth potential on all vulnerable points at all times by the most efficient use of earth return paths.

Where single fusing is used only on the phase side of a circuit, there is every likelihood of the circuit being alive (perhaps dangerous to life) after the phase fuse blows. Moreover, if the neutral is earthed at one point only, it cannot be definitely said that the circuit is always (or ever) dead when the phase switch is out. Not so, however, for single fusing (only) on the phase side of the same secondary supply system when effectively multiple-earthed, because the neutral conductor potential-to-earth will remain at a safe value when the phase fuse blows. This is one of the fundamental objects of multiple-earthing the neutral on consumers' premises, quite independently of economics and safety.

Considerations of Safety

It is necessary to keep clearly in mind the two following important facts: With effective multiple earthing of the neutral return conductor on consumers' premises the consumers' neutral conductor is maintained at the lowest possible potential at all times; and the blowing of the main-service phase fuse on any consumer's premises of such an installation will make every part of the consumer's installation safe at all times.

Thus we are given a simple and positive method of protection, a method inherently a part of the electricity supply and service, a method that is both a direct preventive and a cure, and one that is ample in itself and of itself to definitely end the long-standing controversy brought under the general heading of "safety for the public." In other words, reasons are given why we should put an end to an inherently unsafe, more expensive, less reliable and less profitable system, and why there is no need for "gadgets," three-point devices, &c., introduced as extra costs with the idea of curing or making safe an incomplete system in which earth faults are correctable.

The illuminations at Blackpool are famous throughout the world. About a dozen "Sunshine Girls" (left) are suspended at intervals over the Promenade, and the Cliffs Hotel (right) is a typical example of many excellent hotel floodlighting installations. Further large quantities of G.E.C. lamps were added to the quarter of a million employed last year

The merits of a common primary and secondary earthed return conductor system, and/or a common primary-arrestor earth connection and secondary earthed neutral point, need not be discussed in this article. But it may be mentioned that, for safety or protection, the idea of enforcing a rule such as that a primary-arrestor earth connection shall be placed not less than so-and-so distance from a secondary l.v. neutral earth connection involves the same unsound reasoning as the rule for single-earthing the neutral return at the supply end only (and then waiting for an accidental earth to occur elsewhere). Both rules seem to imply the same serious defects with greater complications for the latter, because of the vastly greater distance between supply-end earth and the accidental earth on, say, the farthest consumer's premises. No doubt the best results can be obtained by bringing the earths together so as always and everywhere to get an approximately *nil* potential gradient. The practice of to-day, in so far as this country is concerned, is to do the opposite, *i.e.*, to place the only allowable neutral earth connection "for safety and protection" the greatest possible distance from the farthest consumer.

The multiple earthing system is usually condemned by those without practical experience of it, and their arguments against its use are high earth current or a poor earth connection on the consumer's premises, but never at the supply end or any part of the single-earth return. Why condemn a system for these or any other readily correctable faults? The general public has long proved quite capable of safely subjecting itself continuously to 230-V to earth, so why this adverse talk about an infinitely safer condition for the general public?

The Norwich Extension

A new 15,000-kW set at Thorpe power station

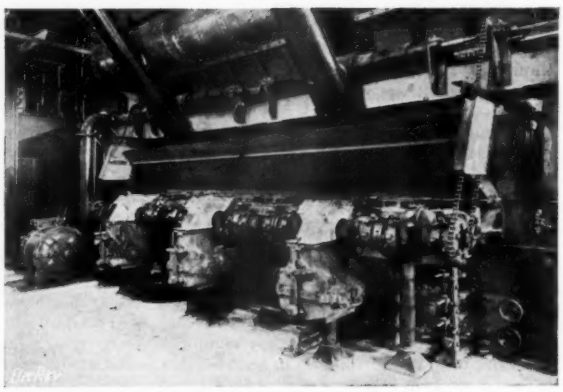
THE Thorpe power station at Norwich Corporation was started up in November, 1926, with three 5,000-kW turbo alternators and four 40,000-lb. boilers. The station was extended in 1928 by a 12,500-kW set and two 50,000-lb. boilers. In 1931 the m.d. reached 18,600 kW and sanction was obtained to the installation of a 15,000-kW unit which was formally put into service yesterday by Mr. F. M. Long, who retired from the position of city electrical engineer on June 30th last, when he was succeeded by Mr. V. A. Pask.

The Thorpe station, which is erected on a site of about eleven acres, possesses an abundant supply of water for condensing and transport and has a good railway connection. It supersedes a 12,500-kW station from which electricity was supplied thirty-nine years ago by a company undertaking which was purchased by the Corporation in 1902.

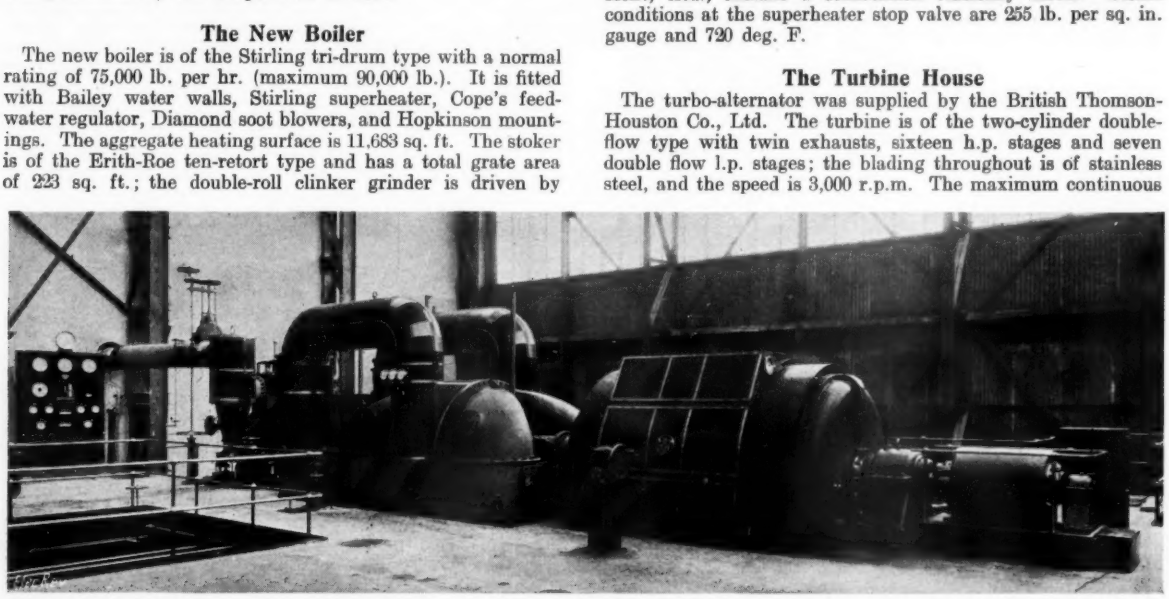
The New Boiler

The new boiler is of the Stirling tri-drum type with a normal rating of 75,000 lb. per hr. (maximum 90,000 lb.). It is fitted with Bailey water walls, Stirling superheater, Cope's feed-water regulator, Diamond soot blowers, and Hopkinson mountings. The aggregate heating surface is 11,683 sq. ft. The stoker is of the Erith-Roe ten-retort type and has a total grate area of 223 sq. ft.; the double-roll clinker grinder is driven by hydraulic gear and discharges into an "Usco" water-trough ash conveyor. Carbofrax Bernitz blocks supplied by the Carboundum Co. are used in the furnace.

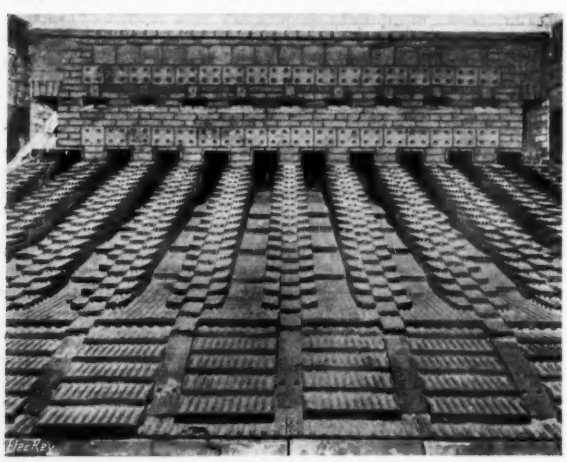
The Foster gilled-tube economiser supplied by E. Green and Son has a heating surface of 6,300 sq. ft. and is fitted with Barry steam blowers. Feed water enters at 190 deg. F. and leaves at 300 deg. F. The Babcock & Wilcox air pre-heater has a heating surface of 6,888 sq. ft. The forced and induced-draught fans and grit arrestors were supplied by Messrs. Davidson & Co., Ltd. They are driven by d.c. motors designed for both 220 and 440-V operation to give a greater range of speed control. The f.d. fan motor is 85 h.p., and the i.d. fan-motor 110 h.p., both by Messrs. Laurence, Scott & Electromotors, Ltd. The boiler control instruments by Messrs. Geo. Kent, Ltd., include a combustion efficiency meter. Steam conditions at the superheater stop valve are 255 lb. per sq. in. gauge and 720 deg. F.



Exterior view of the stoker equipment



The new 15,000-kW turbo-alternator installed at the Thorpe power station



The Erith-Roe grate

The Turbine House

The turbo-alternator was supplied by the British Thomson-Houston Co., Ltd. The turbine is of the two-cylinder double-flow type with twin exhausts, sixteen h.p. stages and seven double flow l.p. stages; the blading throughout is of stainless steel, and the speed is 3,000 r.p.m. The maximum continuous rating is 15,000 kW, the 6.6-kV alternator being rated at 18,750 kVA (at 0.8 power factor). Closed-circuit air cooling is employed.

The feed-heating plant comprises one h.p. and one l.p. heater with drain cooler, all on the suction side of the feed pump; it raises the temperature of the condensate to 190 deg. F. when the load is 12,000 kW. An evaporator fed by steam bled from the same point as the h.p. heater provides make-up water.

The Allen twin shell condensers have a cooling surface of 15,900 sq. ft. and are designed to maintain a vacuum of 29 in. Hg. (bar 30 in.) when dealing with 134,000 lb. of steam per hr. Either of the two extraction pumps will deal with the whole of the condensate. The capacity of the Moody axial-flow c.w. pump (by Messrs. Mather & Platt, Ltd.), is 16,000 gal. per min. against a 16-ft. head. The 110-h.p., 440-V d.c. motor was designed by Messrs. Laurence, Scott & Electromotors, Ltd., to operate at 220 V on light loads with a discharge of 5,000 gal. per min.

Electricity is generated in Norwich not only for the needs of the town but also for giving supplies in an official rural demonstration area of 125 sq. miles, the particulars and prospects of which were dealt with in articles which appeared in the ELECTRICAL REVIEW of March 27th and October 9th, 1931. A special effort is being made to secure an off-peak water load in these areas at ½d. per kWh and there is every indication that Mr. Pask within a few years will find his rural scheme an asset rather than a liability.

The O.L.A. Conversazione

The fifth annual conversazione and supper-dance of the Overhead Lines Association will be held at Harrod's Georgian Restaurant, Knightsbridge, on November 18th. An exhibition of overhead-line equipment is being arranged again this year, in addition to a collection of photographs and drawings of work with which members are associated. Last year 250 participated and there were twenty-eight exhibitors. The function is not confined to members. Tickets, price 12s. 6d. each, are obtainable from the hon. secretary, Mr. G. W. Molle, 32, Shaftesbury Avenue, W.1.

Beckenham Town Hall

A FINE new Town Hall at Beckenham, Kent, was opened on Thursday last week by H.R.H. Prince George in the presence of a distinguished company, including Sir Andrew Duncan, chairman of the Central Electricity Board, Mr. A. H. Dykes, M.I.E.E., chairman of the Beckenham Electricity and Building Committees, and Mr. J. E. Tapper, M.I.E.E., electrical engineer and manager of the Beckenham undertaking.

Electricity provides the major services (lighting and space and water heating), and the building incorporates excellent offices and showrooms for the electricity undertaking, these forming one of the three definite blocks into which the buildings are divided.

The Electricity Department has the High Street frontage, and its block is noticeably different in style from the others, having stone piers supporting a stone entablature. In addition to the main shop windows, those of the two demonstration rooms command views of the High Street and so permit additional attractive displays at night. The three wide bays form the shop front and give a maximum window display space. One window is equipped for automatic-change colour lighting, which will operate continuously without repetition for one hour and forty minutes. Opening out of the showrooms are small furnished model rooms, &c., all well equipped for display work. On either side of the corridor linking this department with the main block are a lighting fittings room, a cooking demonstration room, a model kitchen, and a consumers' room. The main stores is in the basement, and there is also a large workshop. The administrative offices, meter testing rooms, &c., are situated on the first floor.

The buildings as a whole are heated by thermostatically controlled electro-radiators conveniently placed on (or in) the walls and ceilings. The general heating installation is supplemented by electric fires in certain parts of the building, partly for effect, and an outstanding feature is the "Magicoal" imitation-fuel fires in the two fine Adam fireplaces in the committee rooms. These fireplaces were removed from the old Rectory building which formerly occupied the site.

Hot water is supplied from separate local electric storage heaters to each set of fittings. A plenum system of ventilation is installed for the Council chamber. Foul air is carried off by exhaust fans and fresh air is introduced after its passage through a water-spray cleanser and electric heating elements.

Councillor A. H. Dykes, M.Inst.C.E., M.I.E.E. (left), is chairman of the Beckenham Electricity and Building Committees. Mr. J. E. Tapper, M.I.E.E. (right) is engineer and manager

A central suction cleaning plant serves the whole building at convenient points, and synchronous electric clocks are fitted in all offices and rooms. G.P.O. dial telephones and intercommunication telephones are a feature of the electrical equipment. Most of the lighting fittings are of the modern panel type tastefully chosen for maximum light distribution, while for certain positions the fittings were specially designed by the architects. Very effective cornice lighting may be seen in the Council chamber and on the main staircase landing. Mr. Tapper acted as electrical consultant for the lighting, and the installation work, and Mr. A. H. Parker, B.Sc., for heating and ventilation.

The following were among the contractors: Lifts, Waygood, Otis, Ltd.; cleaning plant, Sturtevant Engineering Co., Ltd.; radiators, Bratt, Colbran & Co., Ltd., and Berry's Electric, Ltd.; electric sign, Claude-General Neon Lights, Ltd.; lighting fittings, General Electric Co., Ltd., and Falk, Stadelmann and Co., Ltd.; clocks, Synchronome Co., Ltd.; heating and ventilating, Barker, Young & Co., Ltd.; colour lighting, Holophane, Ltd.; telephones, Siemens Bros. & Co., Ltd.; water heaters, Electric Fires, Ltd. The electrical installation work was carried out by the Mansell Jarrett Company.

Some Views of the New Buildings

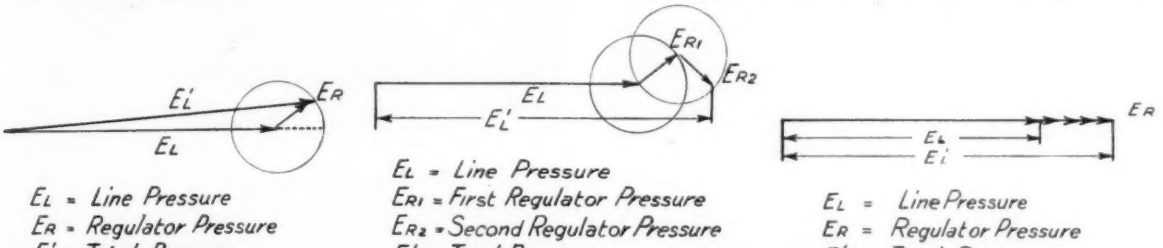
1. The electricity showrooms. 2. The Council chamber. 3. The model dining room. 4. Interior of the showrooms.

Induction Regulators. By V. C. Bryan

Their characteristics, control, and protection

INDUCTION regulators can be classified as follows:—(1) Polyphase single-wound; (2) polyphase double-wound; (3) single-phase connected as a three-phase bank.

The first class has a constant voltage induced in the secondary winding for any position of the rotor, but the phase relation of the secondary voltage to the primary varies with the positions of the rotor. For maximum boost the secondary voltage is additional to the line voltage, and for maximum buck is subtractive; in both cases the primary and secondary voltages are in phase with one another.



Vector diagrams of single-wound and double-wound polyphase regulators and single-phase regulator

For positions intermediate to these extreme positions the primary and secondary voltages of the regulator are separated by a phase angle whose value depends upon the position of the rotor. The power factor on each side is equal, if the small effect of the magnetising current is ignored, and is unaffected by the phase angle which separates the primary and secondary voltages.

The phase shift between the voltage on each side is not objectional upon single circuits, but when the circuit to be controlled operates in parallel with others it may cause circulating currents.

The Double-wound Type

The double-wound induction regulator is designed to enable regulation to be obtained without phase shift between the primary and secondary voltages.

This type comprises two regulators, each of half the capacity of the single-wound regulator of equivalent duty. The regulators are connected with their shunt windings in parallel and their series windings in series.

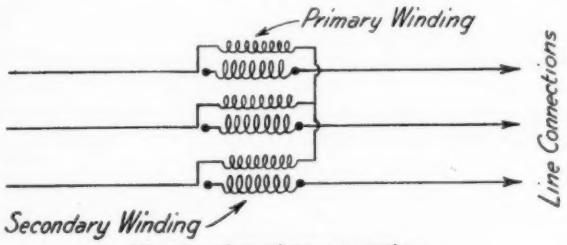


Diagram of regulator connections

The phase shift due to one regulator is neutralised by that due to the other; it is not introduced by varying line pressure.

It is possible by moving one half of the double-wound regulator to maximum buck and the other half to maximum boost to obtain a zero secondary voltage, when the secondary winding may be short-circuited.

There is no condition in which the secondary voltage of the single-wound regulator is zero, and, therefore, under no circumstances can that winding be short-circuited.

With the single-phase induction regulator the voltage induced in the secondary winding varies with different positions of the regulator, but no phase shift is introduced. This type of regulator can therefore be adjusted as the secondary voltage is zero, enabling the secondary winding to be short-circuited.

When the rotor of the regulator is moved to a position where no secondary voltage is induced, the impedance of the secondary winding is considerably increased. To prevent its acting as a choke coil it is usual to fit a quadrature winding.

Switch and Control Equipment

In practice, switching equipment must usually be provided to enable the regulator to be inserted or withdrawn from commission without interrupting the supply.

For the polyphase single-wound regulator choke coils are provided for short-circuiting the regulator, since it has no position of zero boost. These choke coils can be intermittently rated, since they are only in service when the regulator is being put into, or withdrawn from, commission—one or two minutes at the most—but they are generally designed to carry the normal full-load current of the regulator for fifteen minutes.

The correct sequence of switching is ensured by means of interlocks.

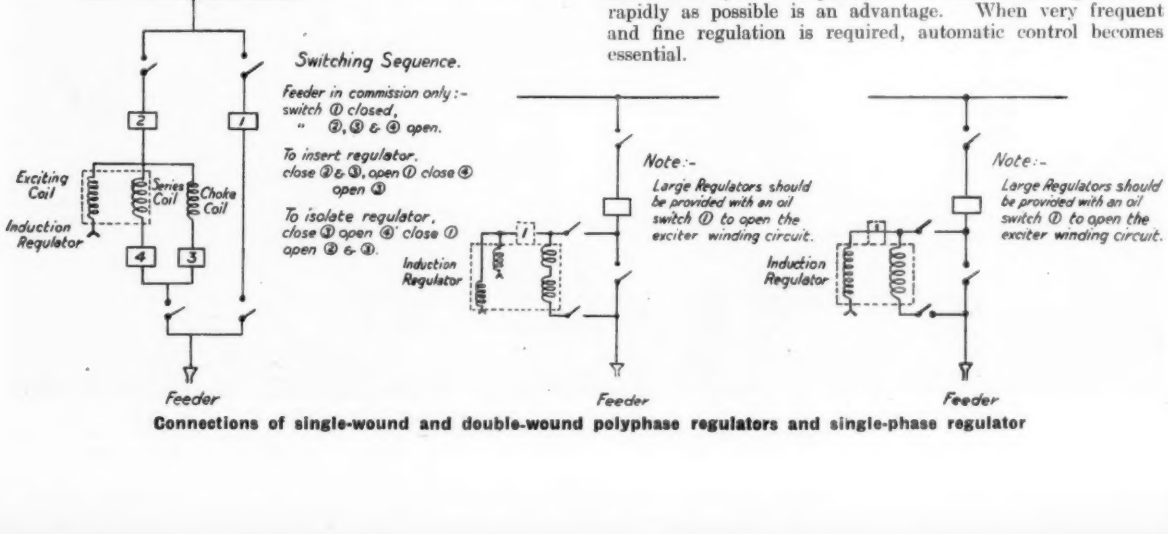
The double-wound regulator, having a position of zero boost can be short-circuited without the use of choke coils, and the control equipment is less elaborate. The single-phase regulator has also a position of zero boost, and can therefore be controlled without the use of choke coils.

Large induction regulators are nearly always of the single-phase type connected to form a three-phase bank, since this arrangement allows individual control of each phase, and often gives a more practical design.

Trouble has occurred abroad due to high-voltage surges on the network produced by the breaking of the regulator circuit by an air-break switch. This effect can be overcome to a certain extent if the exciting circuit, which may be ten per cent. of the regulator capacity, is broken by an oil switch, which tends to break the circuit when the current is zero.

Induction regulators are rarely required to operate at very high voltages and lend themselves to a robust mechanical and electrical design. Internal faults are rare and the regulator can usually be included for protection purposes with the feeder to which it is connected if the latter is provided with overcurrent and earth leakage devices.

When the induction regulator is of large capacity or the effects of a fault are liable to be widespread and serious, a differential system of protection to isolate the regulator as rapidly as possible is an advantage. When very frequent and fine regulation is required, automatic control becomes essential.


Switching Sequence.
Feeder in commission only:- switch ① closed, " ②, ③ & ④ open.
To insert regulator, close ② & ③, open ① close ④ open ③
To isolate regulator, close ③ open ④ close ① open ② & ③.
Exciting Coil
Series Coil
Choke Coil
Induction Regulator
2
1
4
3
Feeder
Note:- Large Regulators should be provided with an oil switch ① to open the exciter winding circuit.
Induction Regulator
Feeder
Note:- Large Regulators should be provided with an oil switch ① to open the exciter winding circuit.
Induction Regulator
Feeder

Connections of single-wound and double-wound polyphase regulators and single-phase regulator

A Large Motor for India

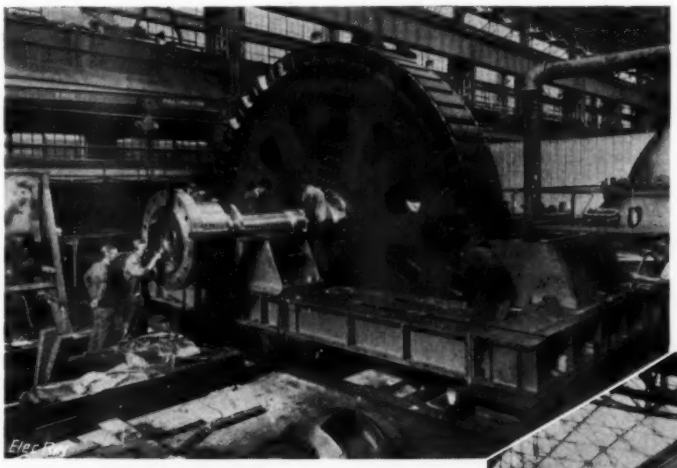
Rapid work at Rugby

ONE of the largest motors of its kind in the world with automatic control gear was completed last week in record time at the B.T.-H. works, Rugby. It is for driving a continuous sheet, bar, and billet rolling mill at the Jamshedpur Works, India, of the Tata Iron & Steel Co.

The outside diameter of the stator frame is 26 ft. and the length of the complete machine over the coupling is 22 ft. 10 in. The total weight of the stator is 53 tons, while the rotor weighs 68 tons, including the shaft and coupling of 21 tons. The total weight of the complete machine with bedplate and pedestals is 160 tons.

On August 19th the British Thomson-Houston Co., Ltd., received the order from the Tata Iron & Steel Co., India, through Associated Electrical Industries (India), Ltd., and on October 22nd the whole of this equipment was despatched.

The existing continuous Morgan mill which this motor is to drive consists of a number of stands in tandem, each driven from a common shaft through bevel gears. The motor drives directly on to the shaft. The mill was originally driven by a 4,000-h.p. 375-r.p.m. induction motor with gear reduction unit, but modifications are being made to enable it to roll larger stock and greater tonnages, with a consequent demand for greater driving power. It was necessary that work on the motor should commence immediately, and within twenty-four hours of the order being received the stator plates were being prepared in the works, as a preliminary to the building up of the frame. On October 8th, the machine had passed its final tests.



The bottom half of the stator and rotor assembled

Special Transport Arrangements

It will be shipped to India by boats sailing on October 29th, and for transportation purposes both the stationary and moving elements had to be so designed that they could be split in two. The stator was transported to the London docks by the L.M.S. Railway, blocking one track, and at one London station the rails had to be slewed 12 in for a distance of forty yards to enable the trucks to clear fixed structures. The 114 tons of remaining material was shipped from Birkenhead.

For a constant low speed a synchronous motor enables a direct drive to be applied to the mill, thus eliminating the gear reduction unit, while at the same time obtaining any desired power factor without employing relatively expensive phase advancing equipment. It has a large air gap, higher efficiency, and a simpler rotor construction.

The motor is rated at 7,500 h.p., 6,300/3,150 V, 50 cycles, 0.8 leading power factor, 93.8 r.p.m., but will be able to take peak loads of 18,750 h.p. The temperature rise at full load rating will not exceed 30 deg. C. above an ambient temperature of 55 deg. C. The machine is totally enclosed, and the starting torque is guaranteed not to be less than 108 per cent. of the full-load torque with full voltage applied, while the pull-out torque is not less than 2½ times full-load torque, and the pull-in not less than half of full-load torque. The motor will withstand twice full load for five minutes without injurious heating. The guaranteed full-load efficiency of 96.6 per cent. at 0.8 leading power factor was slightly exceeded on test, 96.62 per cent. being realised.

The motor is of fabricated steel construction throughout, the only castings being the pedestals and bearing liners. The stator frame is of box section, made up of steel plates and cross bars welded together. Heating units are provided in the stator frame to prevent condensation of moisture on the stator core and windings during idle periods. The stator core consists of segmental soft steel laminations of high silicon content having low hysteresis and eddy current losses, specially treated to prevent circulating currents between sheets.

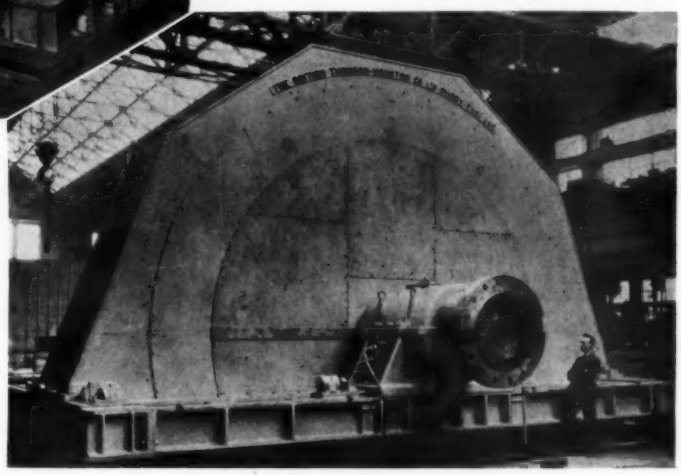
Securing the Laminations

The laminations are held to the stator frame by double dovetailed folding keys, which prevent any possibility of circumferential or radial movement under radial stresses. For holding the laminations axially through bolts are provided between a large number of steel segmental flanges with heavy fingers welded on.

The stator winding is of the two-layer open-slot type with two coils per slot. The conductors are rectangular asbestos covered copper wires, and each turn is insulated with mica tape. By removing the sheet-steel end covers the motor can be converted from a totally enclosed to an open machine.

There are two water-cooled bearings, each 24 in. in diameter and 38 in. long, and in order to take care of accidental fracture of the breaking spindle which connects the motor to the mill, a thrust bearing is incorporated in the driving-end pedestal. The rotor poles are built up of sheet steel laminations, hydraulically riveted together with steel endplates and bolted to the spider. The rotor windings consist of rectangular copper strip wound on edge and mica insulated between turns. Squirrel-cage alloy windings are embodied in holes in the pole faces and short circuited by brass segments.

The rotor spider is of fabricated steel, and is bolted to the shaft, which is of mild carbon steel. After forging the shaft was annealed, and after machining to rough dimensions it was reheated to a temperature just below the "carbon-change" point and allowed to cool freely. A hole was then trepanned through the centre.



The complete motor with its covers

There are links for changing the connections for either 6,300 V or 3,150 V. Provision is made for racking aside the stator frame in order to expose the rotor poles and the inside of the stator core for inspection. Hydraulic jacks are provided for racking the stator along the baseplate.

The Control Equipment

The pedestal master controller has a single point control in each direction only, and merely initiates the starting operation, which is carried out completely automatically by a motor-operated control panel in conjunction with an auto-transformer and reactor in the stator circuit. Push-button provision is made to obtain a higher starting torque with higher line current if required.

Automatic protection is provided, and the separately driven exciter set consists of four machines: a 110-h.p., 3-phase, 50-cycle, 440-V, 970-r.p.m. squirrel-cage induction motor; a 60-kW, 250-V main exciter; a 15-kW, 250-V master exciter; and a 2-kW, 110-V battery-charging generator.

New Hope for the Deaf. By C. M. R. Balbi, A.M.I.E.E.

MINIATURE receivers to enable the deaf to hear can be small enough to fit into the auditory cavity, but this limitation of dimensions tends to reduce efficiency by restricting electro-mechanical design. Recent experiments indicate, however, that the ideal of an almost invisible means of alleviating deafness may be attained.

The ear comprises the outer ear, consisting of the auditory cavity and tympanic membrane, or drum; and the middle ear, consisting of the ossicles, or chain of bones, which transmit the vibrations to a third member, the inner ear, wherein the sense of hearing lies. Obviously the outer and middle ears merely play mechanical parts in conveying sound vibrations to the inner ear, and it is therefore the latter's secrets which science is attempting to probe.

It was suspected by Helmholtz that the 20,000 or so fine hairs called the organs of Corti, which are attached to the bassiliar membrane, acted as tuned reeds and that consequently the inner ear acted as an analyser that converted the sound vibrations into nervous impulses, which, in turn, were transmitted to the brain. Now the fact that the maximum rate of propagation in any nerve found in living tissue is approximately 600 impulses per second means that unless the nerve centres of the ear are of a different character to everything else found in any living body, the ear cannot be the simple analyser supposed, because if it were then the highest note that could be heard would be 600 cycles per second.

In consequence it has been suggested that the higher frequencies may be transmitted as impulses by a series of nerves in rotation, but this new aspect, instead of assisting to explain the theory, tends to confuse matters further.

"Charged" Nerves

Another factor is the discovery of Porter and Hart that nervous stimuli are not proportional to the energy applied, but that they increase in "jumps," as evidenced by the wonderful optical records obtained by those scientists. It seems that a nerve is already charged and that a very small amount of energy is required to liberate it; also that the stimulus is not comparable with the exciting force. It is, in fact, analogous to a sporting gun, which will liberate a large amount of energy by the application of a pull to the trigger. Provided the pull is between certain limits, one shot only will be fired, but a very small increase in the pull may be sufficiently great to operate the trigger of the second barrel. Continuing the analogy, the nerve cannot be "fired" again until a sufficient interval of time has elapsed to reload it, which has been found to be about 1/600th part of a second, For this reason it is difficult to appreciate the way in which loudness is controlled, for it is not possible to detect any jumps in our determination of loudness.

The Application of Electrodes

Prof. E. D. Adrian, of Cambridge, employing a cat as his subject, showed that by tapping its auditory nerve with electrodes and passing the output to an amplifier and a loudspeaker anything spoken to the cat, after passing through its ear and reaching the auditory nerve, would be picked up on the amplifier and would be perfectly reproduced by a loudspeaker, thus proving that whatever form of analysis was taking place in the inner ear the electrical output of the auditory nerve as a whole was identical with the original sound.

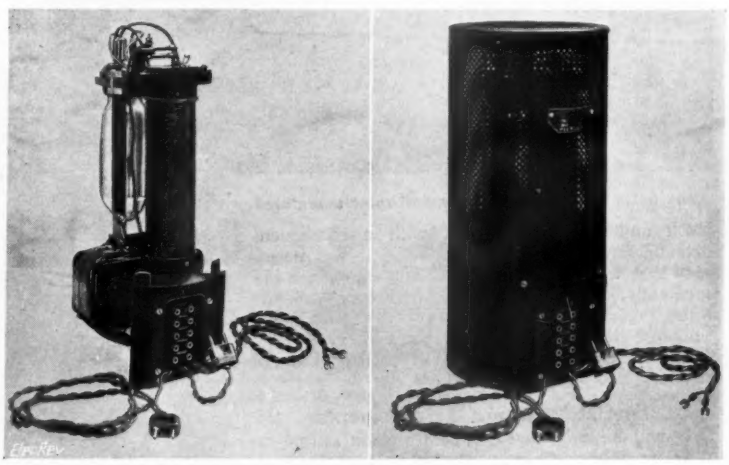
Apart from the general scientific aspect of this experiment, its result means that if electrodes could be satisfactorily introduced into the head and applied to the auditory nerve of a deaf patient, then that patient, even if he were stone deaf, should be able to hear some form of telephonically controlled electrical output. Furthermore, the energy required would appear to be of a very small order. Hence it is possible that with the co-operation of the medical profession it will in future be feasible to fit a deaf person with invisible electrodes and a very small microphone and battery, and so restore his hearing (in spite of any derangement or disease) to a degree never before approached.

The "Rectigor"

A RECENT development for the conversion of a.c. to d.c. is the "Rectigor," a type of mercury arc rectifier having a relatively low output and specially adapted for battery charging from a.c. mains, produced by Messrs. Bruce Peebles & Co., Ltd., Edinburgh.

This has been designed to meet the demand for a simple, reliable, efficient and low-priced convertor suitable for dealing with relatively low currents. It consists of a one-piece unit comprising main transformer, choke coil and rectifying bulb, the whole being enclosed in a perforated cylindrical sheet steel case.

The operation of the "Rectigor" depends upon the valve action of a mercury-arc burning between two electrodes in a highly evacuated glass bulb, the mercury-arc allowing current to pass in one direction only. Thus the current passes alternately by way of the arcs from the two main anodes to the cathode or positive d.c. pole. Each anode carries current during part of a cycle; the cathode carries current continuously. The choke coil has the effect of damping the pulsations, resulting in a practically constant d.c. Auto-regulating resistances maintain the rectified current at a practically constant value, and at the same time reduce the pressure to a value which ensures adequate protection of the bulb in the event of a short-circuit between the anodes. The negative d.c. pole originates at the mid-point of the transformer secondary winding.



The "Rectigor" interior and general view

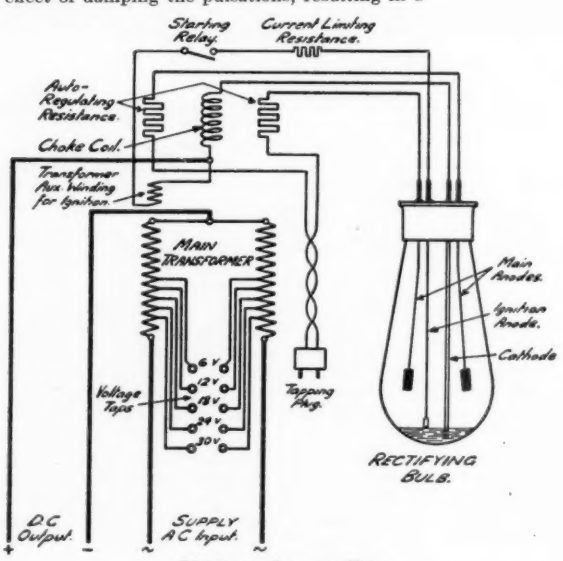


Diagram of connections

The d.c. circuit extends from the mid-point on the transformer forming the negative terminal, through the auto-regulating resistances to the anodes, and thence, by way of the arcs, to the cathode, choke coil, and positive d.c. terminal. The ignition anode is connected to an auxiliary winding on the transformer through a starting relay and current-limiting resistance. Before switching the "Rectigor" into service, the d.c. terminals are connected to the corresponding positive and negative terminals on the charging panel. The tapping plug is then inserted into the sockets on the tapping board corresponding to the voltage of the battery or batteries to be charged. All that is then required is to connect the convertor to the a.c. mains by the plug provided.

Starting the equipment is simply effected by the ignition anode. Upon switching on, a discharge occurs between the mercury and the electrode; by this means the arc is started immediately. The starting relay which is operated by the choke coil then opens and breaks the ignition supply circuit. The apparatus is designed to operate on single-phase, 50-cycle, 220/250-V a.c. circuits, and to give a continuous output of from 2 to 7 A at 6, 12, 18, 24 or 30 V, d.c.

The "Rectigor" weighs only about 28lb., and is approximately 18in. high and 8¼in. in diameter.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Professor Marchant Looks at the Future

THE status of any profession depends to a very large extent on the character of the education which its members must receive, said Prof. E. W. Marchant, the new president, in his inaugural address to the Institution of Electrical Engineers in London on October 20th.

In education it is the method that matters most. Premature specialisation with a view to vocational training is a great mistake, for too much time spent on it is bound to lower the standard of general education which it is important that every electrical engineer should have if he is to hold his own in the world. The educational ladder has been made, if anything, too wide in its lower rungs. Nowadays any really able boy can obtain, without serious difficulty, all the education of which he is able to take advantage. The chief criticism that can be made of the educational system for engineers, as it exists to-day, is that throughout the country there are too many places of instruction, technical schools, and colleges, which are trying to reach an unnecessarily high standard. A considerable economy could be effected by centralising the higher branches of instruction in a smaller number of centres. The part-time day course is a great improvement on the evening course.

Development of initiative and thinking power is the principal end to which the scientific training of an engineer should be directed. Co-operation is another important principle which should be instilled into the engineer; to-day no man can be an individualist, he has to recognise that in the modern world he must work with others. Some knowledge of the fundamental principles of finance and economics is also necessary.

Research and Measurement

No part of the training of a research worker is more important than that of designing the apparatus which will enable him to carry out an investigation. Its construction gives him confidence in himself and a more complete knowledge of the phenomena which he has observed. The importance of accurate measurement can hardly be exaggerated.

Some of the metering stations in connection with the grid are designed for 60,000 kW. With a load factor of 30 per cent. and energy at ¼d. per kWh an error of one-half of 1 per cent. will make a difference of nearly £1,000 per year in the revenue of the power station. Nowadays it is possible with the cathode-ray oscillograph to photograph currents which are changing millions of times a second. Much more careful consideration must be given to the effect of surges on distribution and transmission lines, and the properties of insulating materials when subjected to high-frequency stresses such as are produced by surges. The change in outlook on electrical problems that has been brought about by the surge method of dealing with them is fundamental. The surges do not last very long. As a rule, everything is over in 1/100,000th of a second.

New Lines of Progress

One of the most interesting recent developments has been the transformation of d.c. into a.c. by means of gas-filled relays; tubes have already been constructed capable of dealing with powers of 1,500 kW. These discoveries open up possibilities for the use of direct current at high voltages for transmission, which will increase six or eight times the carrying capacity of the overhead lines already constructed. The cost of the electrical method of transmitting energy under modern conditions is very nearly the same as the cost of carrying the coal which produces the energy. If these developments fulfil their promise, electrical transmission of energy will be substantially cheaper than carrying coal.

The distribution and utilisation of electrical energy to-day offer more scope than any other side of electrical engineering. In a report recently published by the Central Electricity Board it was pointed out that only 14¼ per cent. of the houses in Great Britain had so far been wired for electricity, that less than 30 per cent. of the population had the advantage of an electricity supply, and that only 65 per cent. of the power utilised in factories was produced electrically.

Lighting and Heating Developments

We have heard both in England and in Holland of new developments in highly efficient gas-discharge lamps yielding four or five candles per watt. The fact that two different advances along the line of the gas discharge tube should arrive almost simultaneously shows what promising possibilities this form of lighting seems to have. We are undoubtedly seeing the beginning of a form of electric lighting to the possibilities of which our present knowledge of physics hardly sets a limit.

It is in electric heating, however, that there is the greatest field for development in the use of electricity. Now that power stations have a thermal efficiency of about 25 per cent. the question has assumed a different aspect.

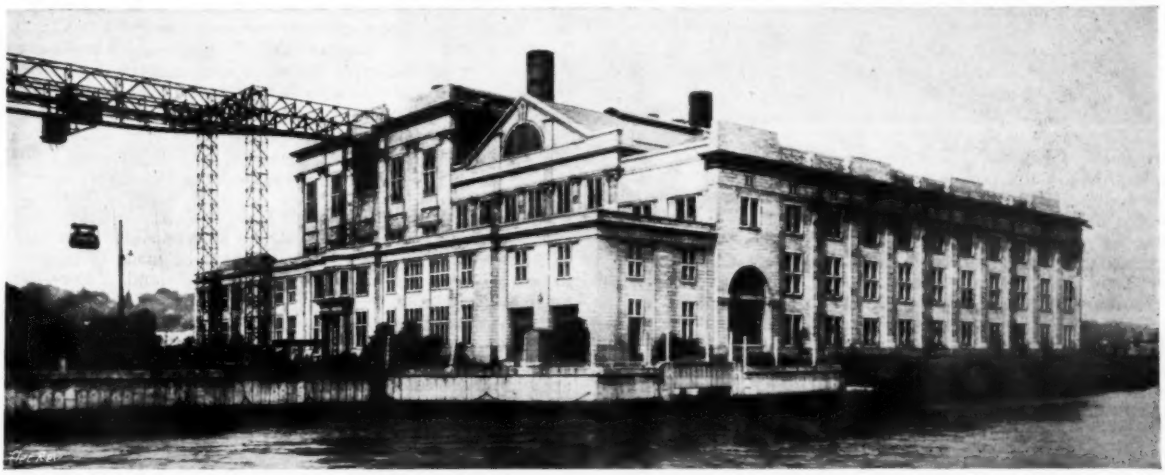
To the inhabitants of our tropical dependencies the introduction of electric lighting and electric power, which would enable refrigerating, ventilating, and other electrical equipment to be installed, would be of immense value from the standpoint of health and efficiency both to the European population and to the natives. If tropical countries are to have enough money to pay for this kind of development, it is essential that their products should secure a remunerative price. There are other sides to this question, and there seems very little doubt that the incidence of disease could be appreciably diminished by suitable engineering development and by the introduction of electricity.

The link between the electrical engineer and the doctor is becoming closer and before long we may reasonably expect that the Institution will find it necessary to establish a section dealing with the applications of electricity in medicine.

The engineer and the doctor are complementary in the service that the more the engineer is allowed to do the less the doctor's services will be required.

The Institution's Future

The range of activity of the Institution is vast in its extent and increasing in every direction. The widening scope of electrical engineering makes it necessary that there should be further subdivision, but with an organic link connecting the sections to a central body, an organism is secured which is much more vigorous and efficient than one consisting of a number of separate units. Strength is gained by co-ordination and co-operation. It is suggested that the time is not far distant when electrical engineers, mechanical engineers, and the civil engineers should attempt to form one greater guild, the nucleus of which exists already in the Engineering Joint Council.



The Thorpe power station of the Norwich Corporation is a fine looking building as our picture shows. The recently inaugurated extensions are described on page 632 of this issue

Certain subjects are common to all engineers, and it does not seem beyond the bounds of possibility that this should be recognised by having a common standard of entrance, so that a man who has qualified to enter on a course of training as a civil, mechanical, or electrical engineer, or as a naval architect should possess a qualification which will be sufficient to enable him to enter any of these Institutions as a student member.

Rural Electrification Work

THE valedictory address which Mr. R. J. Jocelyn Swan delivered to the OVERHEAD LINES ASSOCIATION in London on October 19th showed that useful work had been done during the past year. The publication of the O.L.A. Transformer Specification would give them better value for their money than they had been able to obtain in the past.

Mr. Swan stated that he had just erected a three-phase 11,000-volt 0.05-in. steel core copper line, for which the labour, material, and transport cost only £228 per mile. He had recently extended a supply to the village of Chenies, about five miles from Chesham, by erecting an e.h.p. 3-phase line, about 1¾ miles long. The line was taken to the centre of the village and terminated overhead at a sub-station, from which low-voltage underground cables had been laid throughout the village, 1,589 yards in all. It was an all-electric village, and the gas company had been instructed to remove its gas pipes.

The New President's Views

Mr. A. Lennox Stanton, the new president, in his inaugural address, said that it was evident that the need for the O.L.A. was greater than ever. The development of the domestic load definitely encouraged the use of electricity on scales which few, if any, distribution undertakings in the country were yet in a position to deal with. Misconception needed to be dissipated and wider publicity should be given the Association's aims and objects, for there were numerous areas whose local councils, ratepayers' associations, and other public bodies concerned did not know how to secure adequate electricity supplies at reasonable rates. Great changes in outlook and administrative practice were needed to bring about the desired results. The reason why there were not more rural supplies was because the methods adopted to secure consumers were at fault, and if the Association was ever to be in a proper position to examine, and if necessary present before others, a representative case on any point at issue falling within its scope, it was essential that the necessary data should be available for the purpose as early as possible.

Finally, Mr. Stanton hoped that the proposed National Electrical Convention would become an established fact and, moreover, be truly representative of all sections. In this view he was supported by Mr. Theodore Stevens.

Modern Steam-pipe Requirements

HIGH-PRESSURE and high-temperature steam pipe work was the subject of the paper which Mr. J. Arthur Aiton read before the London Local Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on October 25th.

In this direction the boilermaker's remedies are not necessarily the pipe designer's. So far mild steel (0.15/0.19 carbon, 24/29 tons) is the only material of which h.p. and h.t. pipes have been made in this country and they have already become too thick. Excessive thickness does not necessarily mean strength, for a stiff pipe is subject to heavy expansion stresses. For h.p. and h.t. pipes and vessels riveting has been practically abandoned. Electrically welded steam drums are being introduced into boilers, but, if satisfactory there, it does not follow that this method of manufacture will be satisfactory for steam vessels in pipework.

The effects of the rate of creep and working stresses limit the use of mild steel. Alloy steels are available, but the pipe maker requires material capable of being worked at high temperatures during the manufacturing process without requiring elaborate heat treatment afterwards. The thickness tolerance demanded does not affect strength, but it may seriously increase the thrust on the fixed points to which the pipes connect. If the bore must be maintained, the question of making such pipes on a mandrel from cold finished tubes must be considered. Cold finished tube is much more expensive than the hot finished type, but when all the circumstances are considered, and if the makers of cold drawn tubes will realise their opportunity and seize it by reducing their prices it may well prove to be the cheaper in the end.

The only satisfactory way of joining such pipes is by welding. The best joint has no flanges, the pipes being welded together with ends butting, after which a heavy sleeve is passed over the joint and welded to both the pipes. But it is not easy to erect and weld such a joint on site; it can only be broken with difficulty; and it cannot be made to connect to valves and cast fittings. "Sarlun" and "Corwel" flange joints can be broken and remade.

Plain, creased, and corrugated bends are discussed, then expansion, and the arrangement of pipes and headers. A very good plan is to avoid basement difficulties by building an intermediate floor on the boiler-house side of the engine-room wall to accommodate all pipework, feed pumps, &c.

Welded Steel Frames for Diesels

IN the production of machinery framework both weight and cost can be reduced by the use of steel plates welded by the electric arc process instead of iron castings. In the paper which he read before the DIESEL ENGINE USERS' ASSOCIATION in London, recently, Mr. C. H. Stevens describes how he has devised schemes whereby the strength of the welded structure can be made to depend upon the component members, which are themselves arranged to carry the primary loads, the welding being employed merely as a means of joining the various load-bearing members together. Thus an imperfection of any one weld will not in any way affect the general reliability of the structure.

The author does not intend to belittle the great utility of electric welding, but rather to suggest a method of construction in which arc welding may be used with the greatest confidence for heavily loaded structures when reliability is the first consideration. Two jobs carried out for the British Admiralty are described (both done by the Steel Barrel Co., of Uxbridge), and mention is made of designs for several engine makers which have demonstrated the efficiency and reliability of the method.

Generally engines of small and medium size would be made as monoblocs and this plan would only be abandoned for a sectional arrangement when compelled by the restrictions of machining and handling. Two or more cylinder lines may be made as monoblocs and bolted together. As accuracy is a feature of the system, in no case is more than ¼ inch necessary and very often ⅛ inch will be found sufficient for machining allowance.

Oil ways may be easily embodied in the welding work in the form of steel tubes set and welded in position. Where lightening holes are required they can be cut with the oxy-acetylene cutter before or after completion of the frame. A conventional through bolt design and cast-iron frame can be converted to a through bolt welded steel frame, with the advantage of great reduction in weight.

Colliery Trailing Cables

At the opening meeting of the West of Scotland Branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS, held in Glasgow on October 19th, Mr. A. F. Stevenson, in his presidential address, expressed the opinion that all portable machines which were stationary when working should be supplied through flexibly armoured cables—not with braided fine wire armour, but with the armour made up of stranded small wires. The position with regard to coal-cutter trailers was not quite satisfactory and it was their duty to impress this fact upon the makers and to give a sympathetic, friendly, and helpful reception to any new ideas which might be put forward. The Association was now moving in this matter by arranging for demonstrations of trailing cable repairs. The aim of the Association, Mr. Stevenson said, was not, as was commonly supposed, the improvement of the status of the colliery electrician and the increase of his technical knowledge, but the provision of means whereby the colliery electrician would be enabled to attain these ends by his own exertions. He referred to the lack of candidates for the Association's certificates, and put forward a strong plea for a wider exchange of views and opinions.

Fine Measurement by Electricity

Some of the less-common applications of electricity were dealt with by Mr. D. H. Bishop, engineer of the Dundee Corporation Electricity Department, in his inaugural address as chairman of the Scottish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS at Glasgow on October 18th. He described the methods by which electricity can be used to measure the purity of water or judge the seasoning of wood. He also dealt in detail with the electrical methods employed for measuring small distances, such as are required in gauging and for ascertaining small movements caused by machinery in motion, even although the movement was no more than the thickness of a cigarette paper. In conclusion Mr. Bishop outlined the X-ray examination of metal structures and the use of photo-electric cells for controlling machinery and as applied to the talking film and the timing of races.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Domestic Four-wire Services

In the Correspondence columns of your issue of October 21st Mr. Pidd refers to the practice of connecting lighting to one phase, heating to another, and power to the third when a four-wire three-phase service is laid into a private house. I quite agree with Mr. Pidd that such a proceeding is dangerous for the reason he suggests. Moreover, this method requires three separate meters, one for each phase, even when an "all-in" rate or two-part tariff is adopted.

Instead of dividing each street into three sections, however, each section being fed from a different phase, is it not better to lay a single-phase supply to 90 per cent. of the houses (dividing them equally among the three phases) and to lay a three-phase supply to the remaining 10 per cent.? One phase only of these three-phase supplies would normally be in use, the other two phases in each case remaining sealed off at the supply undertaking's main fuses.

If "out of balance" occurs on the distributor it is an easy matter to change the lead between the meter and the main fuse over to the lightly loaded phase in a sufficient number of houses to restore the balance, while there is no question of the possibility of the consumer receiving a shock at 400 V or over. H. Brierley.

Croydon, *October 24th.*

I have read with interest the remarks of Colin Pidd in your current issue regarding four-wire services in privavte houses. Your correspondent invites severe criticism when he states that a person replacing a lamp in a defective holder when standing upon a defective cooker is liable to a shock of 400 V or over. First: If the defective cooker was properly installed and earthed, a fault would be cleared by the blowing of a fuse; and secondly, at 230 V a.c. lampholders, used in the presence of earthed metal, must be either earthed or all-insulated. This is one of the strongest rules of the I.E.E. code, and would keep the person in question free from shock in case of fault.

May I refer Mr. Pidd to my letter in your September 9th issue on "The Need for Educating the Public," which adequately deals with just such a case as he suggests?

If three phases are brought into houses there should be no danger at all, if the appliances are properly installed. May I remind your correspondent that in factories all three phases are taken to each motor, and no one expects sudden death by standing upon the frame of one of them. N. S. Byers.

Orford, Warrington, *October 25th.*

Electricity and Shipping

In connection with my article upon this subject which appeared in last week's issue it is interesting to note the remarks of Mr. Runciman, President of the Board of Trade, in a speech of October 20th. He stated that when trade recovery does come shipbuilding will be in the very foreground, but orders must be placed for vessels of new design and equipment before the return of world activity and trade. He mentioned that tramp ships which some years ago did nine knots on thirty tons of coal per day now do 9¼ knots on thirteen tons per day.

It might be added that even the figure of thirteen tons could be reduced by fitting exhaust turbine electric auxiliary propulsion equipment and electrically driven deck and engine room auxiliaries.

The President of the Board of Trade has had a life-long connection with shipbuilding and ship management, and he can be regarded as representative of a big proportion of the shipowning and shipbuilding interests. He is anxious for more efficient ships and is looking for new ideas. The electrical industry has something to offer, but as yet the industry as a whole has not put forward any proposition. Shipping is one of our biggest industries, and when trade returns to anywhere near its normal level shipping is bound to prosper.

Mr. Runciman has faith in the future of his industry, and unless electrical people have no confidence in him at all his opinion should be a good guide to the value of the market which he represents. A Marine Correspondent.

October 22nd.

The article on this subject in the Electrical Review of October 21st has brought out several points of interest. The writer of the article advocates a closer contact between the shipping interests and the electrical industry. This co-operation is long overdue, and would prove of great advantage to both parties.

In the past the electrical manufacturers have not devoted sufficient study to the requirements of the marine market, but have rather tried to force on the shipowner equipment of the type used in industrial establishments ashore. This has in many cases proved unsuitable for the severe conditions often met with on shipboard, with the result that breakdowns of

The giant motor described on page 635 leaving the B.T.-H. Works, Rugby, *en route* for India

Beautiful effects have been obtained at Torquay by means of an installation by Besantee Illuminations, Ltd. In all 3,750 lampholders and gaskets and 9,000 ft. of c.t.s. cable were employed

insulation and equipment due to the severe atmospheric conditions and high temperatures met with in various parts of the world have resulted in costly repairs, and have not helped to forward the adoption of electrical auxiliaries on shipboard. The sales staff and agents of many manufacturers are men who have had no experience in the operation of marine installations, and are therefore unable to advise the shipowner on the various problems involved. In other cases it is the old story of "take what we have to offer, or do without."

Another point brought out by the writer of the article is the installation of tiny generating sets in modern vessels, and he seems very upset because these are shut down during the day and in port. May I point out that the sole duty of these small sets is the supply of current for lighting purposes, and in cases of vessels fitted with wireless, to supply power for the small motor-generator set and battery charging. To run sets of this class in the daytime is not an economical proposition, as the wireless transmitter is not in continuous operation, and the only lights required would be a few in the engine and boiler rooms.

As regards a vessel in port, a 5,000-ton general cargo ship, after working hours may have only about a dozen persons aboard—the engineers, officers and possibly a few stewards. It can hardly be expected of the most philanthropic shipowner that he is going to pay the wages of a donkeyman in addition to the cost of coal, lubricants, &c., to maintain steam on the boilers and run the generator for the convenience of these few men. The solution of the difficulty is of course a battery. These are costly to install, but I have no doubt that they will be provided in the vessels of the future when trade conditions improve.

Let the manufacturers study the requirements of the marine market, produce equipment to suit the severe conditions of operation, and employ a staff of marine engineers who are familiar with the requirements and can advise the shipowner as to the most suitable plant, and the adoption of electrical equipment for all services on board ship will advance more rapidly than at present. A. H. Whitlow, M.I.Mar.E.

Portishead, *October 22nd.*

Tobacco Curing by Electricity

I have read your article on "Tobacco Curing by Electrical Methods" in your issue of October 7th, and having had it in mind to grow tobacco here (it being now freed of Excise duty), and having a private 40-kW hydro-electric plant I was doubly interested and would be glad to have further information on the subject, which some of your readers may be able to provide.

I note that "for a 16 ft. by 16 ft. kiln 30 kW would be ample." I calculate that I would not be able to spare more than about 15 kW for the purpose in view. What would be the largest practical kiln that could be worked by a plant of this size? What would be the approximate weight of tobacco that could be treated at one time in such a kiln?

From the article above referred to it would appear that the drying process requires most of the load. By increasing the time taken would it not be possible greatly to reduce the maximum load of the kiln and therefore to increase the size of the kiln in relation to the maximum load? Would this retarded "drying" be detrimental to the quality of the leaf produced? It should be noted in this connection that the consumption in kWh per lb. of tobacco is immaterial, as the current is to all intents and purposes free.

Would it be possible by more effective heat insulation than that contemplated in the article still further to economise power to any great extent? I should be glad to have more detailed particulars of the type and construction of the kiln referred to and also the nature and cost of the electrical apparatus required. F. B. Barton.

Straffan, Co. Kildare, *October 19th.*

The Hotel Lighting Campaign

There is no doubt whatever about the need for the above campaign. The figures given by Mr. V. W. Dale at the E.D.A. meeting reported in your current issue are most astonishing in their revelation of our backward state electrically even in the lighting branch of the industry.

As one who has availed himself of the advantages of electrical illumination to the full in the bedrooms of his home I have felt most keenly the lack of a light and switch near enough to the bed to allow me to read when the hours of the night have hung heavily during residence at hotels, especially at well-known seaside resorts.

When that delightful drowsy feeling arrives after reading, and sleep seems at hand, the act of getting out of bed to switch off the light wakes one up completely and the night is spoiled. In several places lately visited there was one 60-watt lamp somewhere near the foot of the bed—right away from the dressing table—and the only switch was at the entrance to the room—yards away from the bed.

In case somebody may regard this as a trivial matter, may I say that there are hundreds of little things like it, which, if altered, would bring greater prosperity to electrical contractors and to the supply industry? E.D.A. has a lot of hard work before it. Traveller.

October 22nd, 1932.

Conduit in Breeze and Clinker Concretes

In Building Research Special Report No. 15, issued by the Department of Scientific and Industrial Research, attention is directed to the dangers of unprotected steel in contact with breeze and clinker concretes. I have been unable to ascertain to what extent electric conduits are liable to attack, but from personal experience enamelled conduit which was laid in breeze 2¼ years ago still appears in good condition. Perhaps sooner or later it will corrode. That a danger does exist is apparent on reading the report, and the question appears to be, what is the correct antidote?

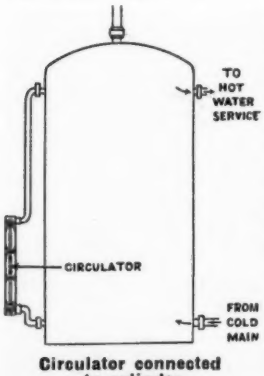
Does enamelling or galvanising afford sufficient protection under normal conditions, *i.e.*, where the buildings are fairly dry? Or should bitumastic paint or some other protection be also utilised?

It would be interesting to hear your readers' views on this subject. Wm. Atkinson.

Wimbledon Park, S.W.19, *October 21st.*

An Improved Water-heater and Circulator

THE accompanying illustrations show an improved water heater and circulator designed to give a continuous flow of water at high temperature. It is constructed of two castings bolted together with a thin gasket between them. The interior is similar to a coiled pipe. Suitable openings are provided for an immersion heater coiled similarly to the pipe-like arrangement in the casting.

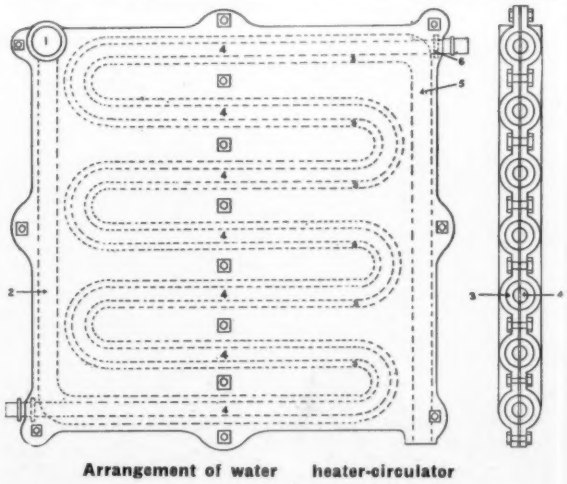


Circulator connected to cylinder

Referring to the larger illustration, 1 is the inlet from the cold-water main. The water tap and switch are arranged so that the water and current are turned "on" and "off" in one operation. The water flows down water pipe 2 and, coming into contact with the hot element 4, it enters the coil arrangement 3 and starts to rise in temperature. Flowing up 3 in contact with 4, the water, on reaching the top of the coil, attains a very high temperature. It then flows down the outlet pipe ready for use. A recess for the water-tight washer is shown at 6.

When using the coil for circulating, inlet pipe 1 is arranged at the bottom of the coil 3 and the outlet pipe 5 at the top. There are two separate elements with different loadings.

The smaller illustration shows how the arrangement can be connected to a hot-water cylinder. If the inlet pipe from the cold main, the inlet to the circulator, and the outlet pipe to the hot-water service are all of equal section, then once the water in the cylinder becomes hot the circulator will supply



Arrangement of water heater-circulator

sufficient hot water to replace whatever amount is drawn off for an unlimited period, with, of course, the electricity supply continuously on.—W. E. Mercer.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

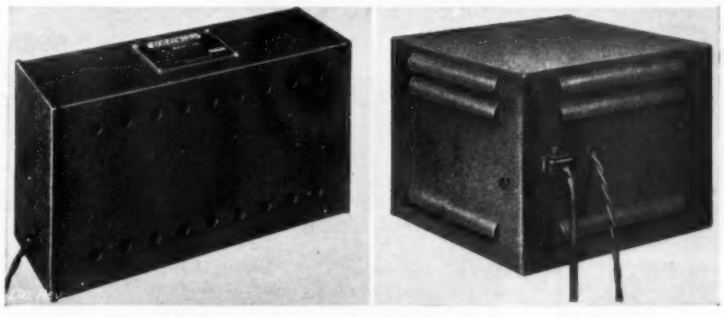
Radio Conversion Equipment

In d.c. areas many owners of wireless receiving sets take their energy from the public mains and the conversion of such sets to operate from a.c. mains presents a problem which has been distracting these set owners as well as the supply undertakings. The d.c. mains radio apparatus falls into two classes: (a) receivers of the battery type, which derive their l.t. supply from an accumulator and their h.t. supply from the mains by means of an eliminator; and (b) the "all-mains" type of set which may, or may not, incorporate a loudspeaker and a gramophone motor.

It would be impracticable to replace the wide variety of eliminators employed in class (a) by alternatives of the a.c. mains type, and it would be considerably more economical to substitute a unit which would give the equivalent of the original d.c. supply. Accordingly the Gecophone BC1534 a.c. to d.c. conversion unit has been developed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway.

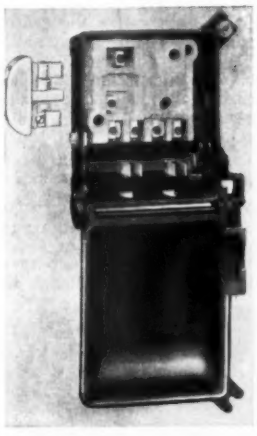
This unit is capable of giving an output up to 30 mA of smooth d.c. supply, suitable for feeding existing d.c. eliminators and is claimed generally to give more silent operation than was originally obtained with the d.c. mains supply. It is housed in a neat black crystalline enamel container, and is sold at £2 17s. 6d.

In class (b) it is usually extremely difficult to rewire an instrument for operation on a.c. mains, and it is again more economical to employ a unit which will give a supply equivalent to the original. For this purpose the BC1533 a.c. to d.c. conversion unit, which is being sold at £8, gives an output up to 350 mA smooth d.c. supply and can operate receivers consuming up to 75 W. This, in general, covers all sets employing ¼-A valves, and the output is adequately smoothed. The circuit employs two Osram GU1 rectifiers and is suitable for 230-V 50-cycles input. A special delay action switch prevents the rectifiers being loaded before they attain full working temperature.



Two new G.E.C. conversion units, BC1534 (left) and BC1533 (right)

An Ironclad Switch and Fuse Box



The B.I. switch and fuse box

A low-priced switch and fuse box has just been marketed by BRITISH INSULATED CABLES, LTD., Prescot, Lancs.

It is a 15-A d.p. box with a new design of fuse holder. The latter is divided across the centre by a porcelain wall which serves to isolate the fuse contacts from each other when the holder is in position, and at the same time, in conjunction with a groove in the base, to act as a guide for insertion of the fuse holder.

The fuse contacts and switch blades are of cadmium copper, one-piece construction, strong, rigid and mounted on a solid steel spindle suitably protected against rust and insulated with "Bakelite." The switch is of the quick-make-and-break type, with positive action and strong mechanism, and the case is constructed of cast iron, stove enamelled. The price of single boxes is 5s.

Sound Recording Apparatus

SOUND RECORDERS, LTD., Sunbury-on-Thames, have recently developed a portable sound recording apparatus. It has been designed to permit easy transport and can be carried in a motor car; when in use it is entirely independent of any external electric power supply; the recording apparatus is worked by a six-spring motor. The whole outfit comprises a microphone, a valve amplifier, with its batteries, and a cutting or recording machine. The apparatus makes permanent records on copper discs which may be played by any gramophone or radio-gram immediately after recording. A machine has just been supplied to the University of Wales for taking about the country for recording the Welsh dialects.

The new sound recorder

A Breakfast Cooker

A new addition to the Carron range of breakfast cookers is a 55s. model fitted with a large rectangular closed boiler-griller loaded at 2 kW. The size of the hob is 16¼ in. by 10¼ in. and the height of the cooker 7 in. The grilling chamber has internal dimensions of 11 in. wide by 8½ in. deep.

The appliance is made of cast-iron and is finished in bright stove black enamel, the hob being finished in mottled grey vitreous enamel. The manufacturers are the CARRON COMPANY, Carron, Falkirk.

The "Carron" breakfast cooker

A Patent Balanced Tower Wagon

The tower shown in the illustration is mounted on a 30-cwt. Albion chassis for the Derby Corporation Transport Department. The elevating gear is made by S. RAWLINSON, LTD., Audley Range, Blackburn, and utilises the company's central screw and cable combination system.

A four-section tower is employed, capable of rising to 30 ft. It is operated at the rear and an interesting feature is the use of four balanced weights which slide up and down the base tower facilitating operation. One revolution of the winding handle lifts the platform 3 ft., and the full height can be reached in a few seconds. The exerted power on the winding handle required for a 30 ft. four-section tower is 8-12 lb., and the tower is lowered by gravity in a simple manner.

A more common type of tower is the

A Rawlinson tower wagon

two-section model which is even simpler to operate. The manual power required on the winding handle is very little and is claimed to be quite equal to the expensive mechanically operated gears.

A Combined Floor Scrubber and Dryer

A new machine manufactured by Modern Domestic Equipment, 34, Fulham Road, S. Kensington, S.W.3, washes the floor on the forward motion and dries it when the machine is pulled backward over the same area. It is driven by a motor surrounded by a container holding two gallons of fluid, chiefly water, thus forming a cooling jacket. The scrubbing mixture, supplied by this firm, is added to the liquid.

Before washing, the floor should first be gone over with a vacuum cleaner or broom to clear it of dust; then, when the handle is gripped and the motor switched on, the cleaner is propelled forward automatically, while the trigger on the handle controls the amount of solution to be applied to the floor.

Explanatory sketch of the combined floor scrubber and dryer

When the machine is drawn back with the trigger released it reclaims the used liquid from the floor and leaves it in such a condition that it dries almost at once. The fluid so collected is strained four times before re-use and a detachable collecting tray for the filtered matter is situated at the bottom of the machine. The brush, when worn, can be rebuilt and returned at a small cost. The price of the machine is £45.

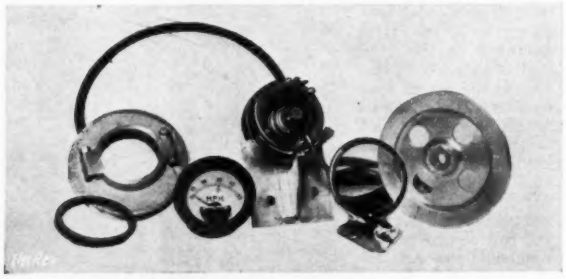
Four "Grelco" adaptors showing assembly

B.T.-H. Electric Speedometer

A new form of electrical speed-indicating equipment for commercial vehicles has recently been introduced by the British Thomson-Houston Co., Ltd., Rugby. The equipment has been evolved in collaboration with Mr. L. G. Wyndham Shire, chief engineer of the Birmingham Midland Motor Omnibus Company.

It consists of a robust electrical generator driven either by belt or from the gear box and a 2½-in. diameter voltmeter which indicates the speed. The scale is practically uniform from 10 to 50 m.p.h. and at 30 m.p.h. the pointer is vertical. The only connection between the generator and special indicating instrument is by two insulated wires.

For gear box drive the generator mounting can be interchangeable with the usual mechanical drive. For belt drives pulleys are provided for the generator and transmission shaft, the shaft pulley being split to permit mounting. The drive is taken through an endless rubber belt and the generator has an eccentric spindle which allows ample adjustment of belt tension. The normal running speed of the generator is between 1,500 and 1,800 r.p.m. for a road speed of 30 m.p.h., and at this speed the output is 6 V. The generator is of the stationary armature a.c. type, the field being produced by rotating permanent magnets of cobalt steel.



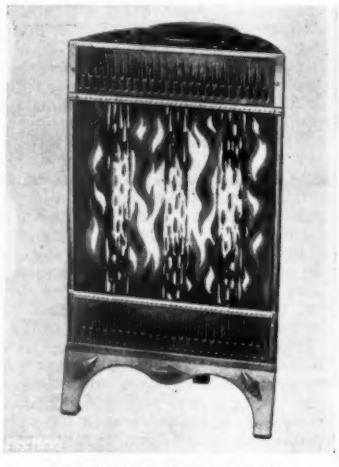
The B.T.-H. speedometer

The speed-indicating instrument is in effect a moving-iron voltmeter specially constructed for use on commercial vehicles. It has a high resistance winding which includes a large proportion of Eureka wire. The instrument element is spring suspended within the case and jewel bearings are provided for the pointer spindle. The pointer and an arrow on the dial indicating the 30 m.p.h. position are luminous. This instrument is of the flush mounting type and may be secured either by three screws or by a clamp fixing, and for dash-board mounting a bracket can be supplied.

A Flame Fire

A recent product of the Artic Fuse & Manufacturing Co., Ltd., Birtley, Co. Durham, is the "Flame Fire." This fire projects radiant heat through a wide angle from a polished parabolic reflector. Flames appear to be flickering continuously and are produced by reflection of the heat rays. It is claimed to circulate warm air at the rate of 200 feet per minute. The loading of the fire is 1.25 kW and the cost 55s., while the height is 21½ in. and width 12 in.

A fire illustrated on page 533 of our "Domestic Issue" was described as the "Artic Flame." This was obviously incorrect as it was an old type of Artic reflector fire which is priced at £7 5s.



The Artic "Flame Fire"

A "Multi-plug" Adaptor

The "Grelco" multi-plug adaptor is claimed to be the only one suitable for all types of standard 5-A switch-plugs. It is particularly useful where the switch lies flush up against the wall, in which case the normal type of adaptor will not fit. Again, when the switch-plug is mounted on the skirting close to the floor the angle of the adaptor permits the use of round top plugs. The illustration shows how any number of points may be added, provided, of course, the current remains under 5 A. The makers are the Grafton Electric Co., 54, Grafton Street, Tottenham Court Road, W.1.

Controlled Lighting

During a recent visit to the showrooms of G.V.D. Illuminators at Aldwych House, Aldwych, W.C.2, we saw the most modern fittings of the firm, including the pendant unit illustrated, which is claimed to give a quality and intensity of illumination only otherwise obtainable by at least double the number of lamps for a similar distribution of light.

A variant is the "Sunlight" model, the globe of which is designed to give a sunlight spectrum. We were informed that the absorption of the glass is only 25 per cent. of the normal (instead of 45 per cent. or more as with many daylight lamps), the unit being completely corrected and not merely mixing corrected light with uncorrected light reflected from the ceiling. These units can also be installed as wall-bracket fittings or on pillars in an inverted position.

A "G.V.D." fitting

A very fine precision artificial daylight lamp for accurate colour matching was also seen. Two filters are used in this unit and the thickness and properties of these may be varied in accordance with the nature of the source of illumination and also in accordance with the type of daylight to which it is desired to approximate. Special units have been evolved for panel, cornice, and lay-lighting (as described in the Electrical Review of September 16th, 1932, page 399).

A hexagonal pillar with a parabolic cone within the frame, which is lighted from the top or bottom, is another handsome fitting, and this should be useful for display purposes.

The prices for the G.V.D. pendant units (including 3-ft. chain, spun brass reflector with focusing gallery on ceiling) with the pearl globe, range from £2 for the 60-W, 10-in. model to £8 for the 300 to 500-W, 18-in. model; the corresponding prices with the "Sunlight" globes are £3 3s. and £11 11s.

Effective Cinema Lighting

THE old Golders Green Ice Rink has recently been converted into a cinema theatre (the "Regal"), with gold and silver cellulose decoration, furnishings of emerald green, and walls and ceilings covered with applied textual paintwork of the most modern character. Electricity is used for controlling the air and ventilation systems, clocks, telephones, signals, film projection, lighting, and power. A supply is taken from the Hendon Electricity Supply Co. at 3,000 V and transformed down to 415 V three phase 50 cycles for power and 240 V for lighting by means of two 205-kVA transformers which supply the main distribution panel. The total load approximates to 400 kW.

The General Electric Co., Ltd., supplied practically the whole of the electrical equipment, including two 30-kW motor-generators, switchgear, "Magnet" conduit, Pirelli-General wires and cables, decorative lighting fittings and accessories, special equipment for the projection room, "Osram" lamps, and an emergency lighting system, as well as Claude-General neon signs for exterior lighting.

The lighting of the "Regal" Cinema, Golders Green

The main lighting of the auditorium is divided between primary and secondary installations, placed alternately in the decorative lighting fittings and behind the laylights with special independent circuits controlling the exit signs. The secondary (emergency) system is fed from a special 5½-kW motor-generator set for the trickle charging equipment covering the emergency lighting, consisting of a 3-phase squirrel cage motor running at 950 r.p.m. directly coupled to a compound-wound generator giving an output of 40 A at 100/140 V. The generator is level compounded at 100 V, and the ends of the series winding are brought out to separate terminals for independent external connection.

The secondary lighting system has been devised by Mr. Basil Davis, A.M.I.E.E., the cinema's consultant. A special type of trickle charge control panel for this set is also installed. The motor generator set runs continuously with a trickle charged battery of 150-Ah capacity floating across the generator, which is capable of maintaining the secondary lighting for a period of three hours.

The auditorium decorative lighting is a single colour installation controlled by a motor driven dimmer, which is operated by push button remote control from the projection room and stage. For the main ceiling lighting six specially designed rectangular fittings, with 600 W in each, are wired on three circuits. Side lighting is provided by fourteen specially designed and glazed fittings arranged on the caps of the pilasters around the auditorium, each of 360 W. The proscenium arch lighting is all concealed, there being four 20-ft. vertical lengths of 25 W lamps, two on each side of the arch, giving a total load for the proscenium arch lighting of 4,000 W. Niches on each side of the proscenium opening accommodate 1,000-W glass standards. There are also seventeen illuminated laylights in each of which there is a lamp total of 500 W. Recessed cornice lighting is arranged around the whole of the main ceiling. In all there is some 384 ft. of this concealed trough lighting equipped with 15-W lamps, the total load of the main ceiling cove lighting being about 6,000 W.

An automatic motor driven dimmer bank is arranged on three phases to take loads of 11,000, 10,000, and 9,000 W, controlled by three 50-A double-pole reversing contactor switches arranged for push button control. Emergency lighting is provided by a single pole contactor connected across the terminals of one of the dimmer sections in such a manner that when it is closed that section is switched on. It may be operated from three positions in the auditorium by push buttons.

The stage lighting equipment consists of two battens, one footlight and four single-colour stage plugs operated by a remote controlled automatic dimmer board operated from the orchestra pit, the total loading in each batten being 2,700 W. The stage switchboard has fourteen dimmers complete with all switching apparatus. A comprehensive luminous signal system has also been installed, together with synchronous electric clocks. The total lighting loads are: auditorium decorative lighting about 30 kW, and stage lighting about 34 kW.

The electrical contractors were Messrs. Leaf & Carver, Westminster, S.W.1.

A Simplex Co-ordination

FOR some time past important developments have been in progress affecting the future of several companies in the electrical industry. They have now taken definite shape in the establishment of the Simplex Electric Co., Ltd., which has its head office at Empire House, 159, Great Charles Street, Birmingham, comprising the electrical interests of Tube Investments, Ltd.

Through this new organisation it is intended to co-ordinate the companies' individual interests, to combine manufacturing resources, and to pool knowledge, experience, patent rights and research work. Dating from November 1st the sale and distribution of the electrical manufactures of Simplex Conduits, Ltd., the Credenda Conduit Co., Ltd., the Stella Conduit Co., Ltd., the Perfecta Seamless Steel Tube & Conduit Co. (1923), Ltd., and Simplex Electric Switchgear, Ltd., will be undertaken by the Simplex Electric Co., Ltd., which has been formed expressly for the purpose.

The new company not only expects to reach higher standards of quality and design in the co-operating works than any of its separate companies could secure, but it will be able to give a quicker and extended service in a much wider range of goods. The direction of the new organisation will be in the hands of those previously responsible for the management of the separate companies, so that there will be no sacrifice of personal contact through the change.

It is requested that, as from October 31st, all communications should be addressed either to the head office already mentioned, or to the branch depôts of which particulars are given in an official pamphlet issued relating to the matter. This pamphlet is jointly signed by the following directors: Mr. H. F. McLoughlin, for the Simplex Electric Co., Ltd., and Simplex Electric Switchgear, Ltd.; Mr. P. W. Davis, for the Credenda Conduits Co., Ltd.; Mr. John Huntington, for Simplex Conduits, Ltd.; Mr. D. M. Moffat, for the Stella Conduit Co., Ltd.; and Mr. H. Trevorrow, for the Perfecta Seamless Steel Tube & Conduit Co. (1923), Ltd. These gentlemen are all directors of the new Simplex Electric Co., Ltd., as are also Mr. J. Herbert Aston and Mr. P. Schloss.

We reproduce a photograph of Empire House, of which the new company occupies two complete floors. The office equipment is of the most modern type. The wiring throughout is

The headquarters of the Simplex Electric Co., Ltd.

in "Simplex" conduit and "Simplex" switch and fuse gear is installed. Special attention has been paid to lighting and the heating is entirely electric, being provided by "Creda" fires and tubular heaters.

New Books

Dielectric Phenomena. Vol. III. Breakdown of Solid Dielectrics. By S. WHITEHEAD. Edited by E. B. Wedmore. Pp. 346; figs. 140. London: Ernest Benn. Price 30s.

This volume completes the trilogy of works issued by the British Electrical and Allied Industries Research Association, which survey discharge phenomena in dielectrics, gases, liquids, and finally, solids. The present book is planned on lines similar to those of its predecessors and, in addition to presenting an orderly summary of published knowledge, a considerable amount of hitherto unpublished experimental and theoretical work is included.

The first nine chapters deal with the available experimental evidence, while chapter ten and a lengthy appendix are concerned with the theories of the breakdown of solid dielectrics. In the experimental section, the author deals with time effects, the influence of electrode arrangements on breakdown voltage, breakdown of combined dielectrics, surface discharges, effect of frequency and wave form, effect of temperature, effect of moisture and other effects such as high frequencies, mechanical stresses and magnetic fields.

The data apply to the materials commonly employed in electrical engineering, but it should be borne in mind, when using them, that the sources of information upon which they are based are world wide, and thus materials manufactured in different countries, which nominally are the same, may not be identical electrically. On the other hand, in past years, a not inconsiderable volume of international business has been transacted in insulating materials and to some extent this would tend to average out the test data.

The volume is confined to the study of solid dielectrics *per se*, and it does not deal with the electrical and thermal stresses which arise in a given particular form of practical engineering structure. The substance of it, however, is such as should enable the designing engineer to predetermine with a fair degree of accuracy the stresses which are likely to occur in commercial machines. Its price will, however, restrict its circulation considerably, which will be regrettable.

Die Raumänderungen der Baustoffe. By DR. ING. HEINRICH LUFTSHITZ. Pp. ii+50; figs. 71. Berlin: Verlag Wilhelm Ernst & Sohn. Price 6.50 marks.

This monograph is an abridgment of a 393-page thesis submitted to the Technische Hochschule, Dresden, embodying the results of ten years' research on the properties of building materials, including cements, artificial sandstone, natural stones, limestones, magnesia and refractories. Its interest to electrical engineers lies in the information given concerning the behaviour of cemented insulators.

In its present form the publication constitutes a concise statement of the author's conclusions regarding the nature and characteristics of the cement gel, and a data book presenting the chief results of his researches into the changes in volume of cements and other materials during setting, ageing and under the influence of heat. The practical interpretation and application of shrinkage and expansion curves are discussed, and special attention is drawn to the author's tests for determining the suitability of cements for insulators and other purposes. Much of the specific information falls outside the electrical field, but, on the other hand, an accurate appreciation of the subjects dealt with is required in many branches of electrical work, including power station construction, cable ducts, switch cells, insulators, boiler refractories, and so on.

Induction Coil Theory and Applications. By E. TAYLOR JONES. Pp. viii+244; figs. 131. London: Sir Isaac Pitman & Sons. Price 12s. 6d.

Really good modern books on induction coils are not easily found, and therefore the engineering profession should be grateful to Dr. Jones. The present volume is an extended and modernised treatment of his early work, the "Theory of the Induction Coil," published eleven years ago. The treatment embraces studies of transient electric currents in inductive circuits, maximum secondary potential, oscillographs, wave forms, the primary circuit, the secondary potential at "make," induction coil discharges, the diffraction of electrons by thin films, oscillation transformers, spark ignition, triode oscillations in coupled circuits and electron diffraction by nitro-cellulose films. The book deals with both the practical and theoretical aspects of induction coil theory, design and application and the mathematical sections do not extend beyond the ordinary calculus standard. Discharge phenomena are illustrated copiously by exceptionally clear oscillograms, and the entire production is a credit to the author and publishers alike. The technical value of the contents, together with the modest price of the book, should ensure it a wide sale.

* * *

Shorter Notices

Messrs. Siemens Bros., & Co., Ltd., Woolwich, have compiled a pamphlet entitled "Wireless Telephony at Sea," primarily for the information of shipowners who have not heretofore had experience of wireless service to indicate how coasting ships, trawlers, yachts, &c., which are not fitted compulsorily with such equipment are able to secure the advantages of radio communication by employing the Siemens wireless telephone-telegraph set, which does not require a specially trained operator. The new outfit is compact and robust, yet simple to operate. The design of the frame embodies receiver and transmitter and makes for simplicity of control. A useful feature of the pamphlet is the reference to the wireless telephony organisation available for ships, together with notes on licences, the obtaining of certificates, and the charges for telegrams.

"Electrical Tables and Memoranda," by Silvanus P. Thompson. Third Edition. Pp. 202. London: E. & F. N. Spon. Price 1s. 6d.—This useful little booklet, measuring only 2¾ by 2 in., fits easily into the waistcoat pocket and yet deals with all branches of electricity from primary batteries and electrical units to domestic applications, and from the cost of energy to the mathematics used in electrical problems.

"Lärm und Resonanzschwingungen im Kraftwerkbetrieb," by Dr. Ing. F. Michel. "Die Wärmeübertragung bei zähen Flüssigkeiten." "Regeln f. d. Abnahmeversuche an Dampfturbinen." "Regeln f. d. Abnahmeversuche an Rückkühlanlagen." "G. H. H.—Mitteilungen." Bd. 1. Heft 9 and 10. Berlin: V. D. I. Verlag.

"Telephony," by T. E. Herbert and W. S. Proctor. Vol. I, Manual Switching Systems and Line Plant. 2nd edition. Pp. 1,218; figs. 844. London: Sir Isaac Pitman & Sons. Price £1.

"The Elements of Switchgear Design," by Dr. Ing. Fritz Kesselring. Pp. 182; figs. 81. London: Sir Isaac Pitman & Sons. Price 7s. 6d.

"Elektrische Lichtbogenschweissung." By Karl Meller. Pp. 398; figs. 374; tables 31. Leipzig: Verlag von S. Hirzel. Price RM. 27.80.

Let the Sales Manager Manage!

THE criticism bestowed upon sales managers and salesmen, in my opinion, is often wrongly placed. It is not the sales manager who should be attacked but the methods behind him—boards of directors assuming that having a good article is all that is necessary. What is wrong with most sales managers is that they are regarded as nothing more than personal salesmen. It is forgotten that their job is one of management. In large organisations there is the factory, the commercial department, and the selling side. The factory gets ahead with the job (in its own way), the accounts department collects with a hammer, the publicity department also carries on in its own way, and the sales department is just an odd freak of nature. Yet all departments live by sales and should therefore be managed by them, and the sooner this is recognised the better.

There is only one management that comes in after the product is made, and that is sales management. Immediately after the article is completed its sales management begins. One fault at present is that there is a gap between the time at which the article is made and the time the sales management comes in, and it is here that the other commercial departments take the "manage" out of sales management, and in consequence it is not until there comes the actual selling that the sales management is consulted, if at all.

The sales manager is expected to think that he has to regard stocks, accounts, publicity, &c., as outside his province. This should not be so, for in my opinion the sales manager should be regarded as the commercial manager. In large organisations it is generally supposed that the sales manager is in charge of sales only. I contend that in the same way as he is responsible for sales of the finished product so he should be responsible for everything connected with the servicing of the product. The sales manager should set forth a frequent programme of advertising and he should say what is to be advertised and when it is to be advertised.

After the manufacture of the product comes service, and it is most important that the administration should come under the control of the sales manager. If orders are delayed, if the telephone service is not good, if cash is collected in a tactless manner, if stocks are short, all this will affect sales, and anything that affects sales is the sales manager's job. It is a very difficult thing for a sales manager to convince his sales force that he has every confidence in the factory and the men in charge if he only meets them occasionally.

Another important point which concerns the directorate of large companies is in having the right type of sales manager. I consider that it is entirely wrong to expect (as is often the case in our own industry) a trained engineer successfully to fulfil the duties of sales manager, a position that can only be adequately taken by a commercially trained mind. Just as it is important that an engineer should have passed through the engineering shops, so a sales manager should have passed through the selling field on to a managerial position.

In these days of economies the importance of bringing all commercial departments connected with sales under one head cannot be too strongly stressed.—F. C. TYRRELL.

Legal

Sequel to a Fatality

At the York City Police Court last week the National Glass Works (York), Ltd., was summoned for a breach of the Electricity Regulations under the Factories and Workshops Act. It was stated that a workman using an unearthed extension lamp at the defendant's works received a fatal shock. An employé of the company, Daniel Hughes, who was stated to have been responsible for the extension, was also summoned for doing this without the knowledge or consent of the company.

Officials of the company gave evidence in which they denied that the extension was made with their sanction or knowledge.

The magistrates found the case against the company proved, and imposed a fine of £20 and costs. While they considered that Hughes had not shown sufficient caution in making the extension, the summons against him was dismissed.

A Passing-off Action Dismissed

Last week Mr. Justice Clauson concluded the hearing of an action brought by the Ormond Engineering Co., Ltd., against Mr. Adolph Knopf to restrain him from selling or dealing under the description "manufactured under Ormond patent" any goods not manufactured or licensed by the plaintiffs.

Mr. Spens, K.C., for the plaintiffs, said the action was concerned with passing-off only and no infringement of the patent was claimed. The plaintiffs claimed that the defendant was selling dials for wireless condensers marked with the words, "made under Ormond patent," which were not under any patent or licence of the plaintiff company.

Some time ago the plaintiffs had granted a licence to an English company to manufacture and sell these dials, and apparently they were made for the company by a German firm. The English licensees then quarrelled with the German people and ceased to have business relations with them. The German firm, however, went on manufacturing the dials and sent them direct to certain persons in this country, amongst them being the defendant. No fraud was alleged against the defendant, the fraudulent persons being in Germany.

Sir A. Colefax, K.C., for defendant, contended that the plaintiffs had established no cause of action. The defendant was entitled to claim that the use of the expression complained of could not be presumed to be otherwise than an innocent use. Moreover, the plaintiffs had not proved that they had suffered any damage from the sale of the dials. The patent was bad, and that was why there was no allegation of infringement.

His Lordship, in giving judgment, said that he saw no evidence that the plaintiffs were either making or selling the dials. The plaintiffs had certainly not proved any damage, and he could not find any evidence of passing-off at all. The action would be dismissed with costs.

The Radiovisor Litigation—Judgment Reserved

On Monday last, Mr. Justice Lawrence, sitting in the King's Bench Division, reserved his judgment in the action in which Radiovisor (Foreign & Colonial), Ltd., sued Radiovisor Parent, Ltd., to recover £200,000 damages and return of 120,000 £1 shares. Defendants denied both damages and misrepresentation in the sale to the plaintiffs of the rights in a selenium light bridge.

Sir Stafford Cripps, K.C., for the defendants, summed up their case and said the plaintiffs attached a prospectus, but he wished to point out that a prospectus was a commercial and not a scientific document and was prepared for non-technical people. In the prospectus was the statement that the apparatus had proved constant in resistance and the two proofs were its use in public lighting at Barnes and laboratory tests with street-lighting units, which, after being in operation for seven months, were working entirely satisfactorily.

His Lordship said he had for one thing to address his mind to the fact of the non-disclosure to the board of Mr. Gilbert's report, a report which for some people was a matter of consternation. The report was duly filed at the laboratory, when, if the defendant company had been dealing with people it intended to deceive, it could easily have destroyed it. It remained and came into Mr. Terrell's hands.

Sir Stafford Cripps said that the report, which dealt with the effects of temperature on the bridge, received the same consideration as other technical reports. In any department not one in a hundred was shown to the directors. The report had been looked on as a calamity, but if it had been disclosed at once the defendant company might have been deflected from work on the bridge which it had since developed and might have started on the temperature compensating bridge, which it never used. What was more to the technical point was that Mr. Terrell and those with him never asked to see any figures or curves at all.

Sir William Jowitt, K.C., replied on behalf of the plaintiffs. He said although he did not contend that the statements in the prospectus of the Parent Company were dishonest, he maintained that they were made recklessly. It was impossible for Mr. Terrell, the managing director of the plaintiff company, the Duke of Atholl, the chairman, and Mr. Swinburne, to know whether these statements were correct or not. It was only when the records dealing with the performance of the bridges were disclosed that all the facts were known. Counsel also commented on the fact that Mr. Neale, the inventor of the bridge, had not been called as a witness. He would have known when the prospectus was issued whether the statements made were correct or not.

Mr. Mitchison, for the defendants, said that Mr. Neale's whereabouts were not known and that was the reason why he had not been called.

Sir William Jowitt, proceeding, said that knowing the previous technology of the bridges to the extent they did, and that there was ground for supposing that temperature affected them, why did the defendant company assert emphatically that the bridges would not vary by temperature, but only with the intensity of light?

Alleged Infringement of a Tramcar Patent

The *Yorkshire Post* reports that Mr. Justice Clauson, on October 18th, in the absence of the plaintiff, dismissed an action brought by Mr. James McCreath, Bootle, against the South Shields Corporation and Mr. J. A. Baker, general manager of the Corporation's Tramway Department. The plaintiff alleged infringement of his patent for a device used on tramcars.

On the following day Mr. McCreath asked that the case should be restored and the judgment set aside on the ground that he had not been warned in time to enter an appearance. The Corporation had applied for a licence to work his invention and he was willing to grant this and discontinue the action against the Corporation.

His Lordship gave plaintiff leave to serve notice of motion on Mr. Baker, to apply on November 2nd, for the case to be re-heard and the order made to be discharged. Mr. McCreath must be prepared to pay the costs thrown away and he must satisfy the Court that he had a *prima facie* case.

Radio Valve Price Action

In the Chancery Division on Tuesday last Mr. Justice Eve heard a motion on behalf of the Mullard Radio Valve Co., Ltd., Balham, S.W., to restrain Mr. Mark Wiseman, of 80, High Street North, East Ham, trading as the Gas Light and Radio Co., pending the trial of the action, or further order, from selling or offering for sale or disposing of otherwise than as part of a wireless set any wireless valve manufactured under any of the plaintiffs' letters patent and licensed for

The Beckenham Electricity Department was active in the electric cooking field as long ago as 1910. Our picture shows Mr. F. S. Grogan giving a practical demonstration at that time with an early "Tricity" cooker

resale as part of a wireless set only, and from selling or offering for sale any valve manufactured under plaintiffs' letters patent below the price fixed by the plaintiffs.

Mr. Graham, for the plaintiffs, said that the defendant had submitted to an injunction in the terms of the notice of motion and had agreed to pay the plaintiffs £15 by way of damages and £35 towards the plaintiffs' costs and expenses.

His Lordship consented to an order accordingly.

Marconi's v. Philco

Mr. Justice Clauson, in the Chancery Division on October 20th, heard an application by Mr. Tookey for the fixing of a day for the hearing of an action by Marconi's Wireless Telegraph Co., Ltd., against the Philco Radio & Television Corporation of Great Britain, Ltd. Mr. Tookey said that the case would probably last a week. The Counsel in the action were engaged in another action to be heard on November 1st, and it would be inconvenient if they both came on together.

Mr. Mould, for the Philco Co., agreed, and his Lordship directed that the action should not be heard until December 1st.

Shock at a Hairdresser's

The *Star* reports that damages amounting to £10 were awarded at the Croydon County Court last week against a local hairdresser in consequence of a shock received by one of his customers. The plaintiff stated that while she was having her hair waved something went wrong with the electrical apparatus and she received a shock which felt "like being pulled up by the head."

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Soviet Orders Placed in Great Britain

The Government's decision to terminate the temporary trade agreement with Russia has led the Russo-British Chamber of Commerce to issue a statement showing that nearly £800,000 worth of orders has been placed during the last two months by Russian trade organisations. Among the orders included in the list are one valued at £150,000, placed with the Metropolitan-Vickers Electrical Co., Ltd., a £60,000 contract for electric furnaces with the Birmingham Electric Furnaces, Ltd., and the Electric Resistance Co., Ltd., as well as switchgear to the value of £4,000 from Messrs. Ferguson, Pailin, Ltd., instruments from Messrs. Elliott Bros., and trolley locomotives (£10,000) from Messrs. Greenwood & Batley, Ltd., while £5,000 worth of compressors has been ordered from Messrs. Belliss & Morcom, Ltd., and coalcutters (£1,500) from Messrs. Mavor & Coulson, Ltd. Out of £790,000 worth of orders more than one-third is connected with the electrical industry.

The New Patents and Designs Acts

The new Patents and Designs Act, 1932, which comes into force on November 1st, contains some points of immediate interest to inventors. Messrs. Gee & Co., patent agents, 51-52, Chancery Lane, W.C.2, draw our attention to a few of these points: The period for filing complete specifications after provisional specifications, also for accepting complete specifications, is three months longer than at present. The period for sealing a patent is also three months longer (in certain cases even more). As the new Act is retrospective in these matters, it will be a boon to certain applicants who wish to proceed with their patent applications, but cannot do so at present by reason of their being out of date. A complete specification filed on and after November 1st will require an official stamp of £4 instead of £3 as at present. The official search will include foreign patents of the previous fifty years and other documents instead of being limited to British patents as at present.

Improvements in H.P. Cables

Cablon, Ltd., is applying for permission to amend the Specification of Letters Patent No. 264,135 granted to Martin Hochstadter for an invention entitled "Improvements in h.p. cables." Notice of opposition must be presented to the Patent Office by November 19th.

Ever Ready Competition Results

The results of the window-dressing competition organised recently by the Ever Ready Co. (Gt. Britain), Ltd., have now been published. The winners of the four special prizes of £100 each were Messrs. E. V. Lomas-Smith, Camberley; Marshall Brothers, Moseley, Birmingham; George Brown & Co., Carlisle; and Seal & Ball, Ltd., Southport. In addition, eight prizes of £50 and £25 each were awarded, and forty of £5 each.

recently in the Stoke-on-Trent Town Hall, at which the Corporation Electricity Department had a display of domestic electrical appliances. Mr. C. H. Yeaman, the borough electrical engineer, informs us that the stand was well attended, and did a great deal to educate the public, particularly the coming generation. The accompanying illustration shows the attractive layout of the stand.

Austrian Electrical Trade

During the first half of the current year imports of electrical machinery and appliances into Austria amounted to 1,166 tons (valued at 9,951,000 schillings), as compared with 1,815 tons (16,054,000 schillings) in the corresponding period of 1931. Exports declined from 2,933 to 1,843 tons (28,757,000 to 18,930,000 schillings).

Switch and Fuse Installation

The Midland Electric Manufacturing Co., Ltd., has sent us a booklet entitled "Hints to Users of Electric Switch and Fuse Gear," containing much valuable information in connection with the design, performance, installation and maintenance of switch and fuse gear. Copies of the booklet, which should prove of great value to anyone connected with installation work, particularly to those interested in the sale of electrical materials, will be sent by the company on request.

Employment During September

The *Ministry of Labour Gazette* states that employment in the engineering industry during September was very bad on the whole, the total out of work being 274,055, as compared with 274,537 in August; the percentage unemployed remained at approximately 27.3 per cent. In electrical engineering employment was moderate, there being a decrease in unemployed from 15,057 to 15,028 (representing 16.3 per cent.). There were declines from 13,268 to 12,707 (from 12.2 to 11.7 per cent.) in the electrical cable, wire and lamp manufacturing group, and from 4,806 to 4,506 (from 21.4 to 20.1 per cent.) in the electrical wiring and contracting industry.

Swansea Power Station Contracts

After a debate lasting over five hours the Swansea Borough Council on October 21st decided to place the contract for the turbo-alternators for the Tir John North power station, now in course of construction, with Messrs. C. A. Parsons and Co., Ltd., their price for a 33,000-V scheme being £139,599. The recommendation of the Electricity Committee, which was rejected, was that an 11,000-V scheme be adopted and that the tender of the English Electric Co., Ltd., at £133,644 be accepted. This completes the two large tenders for the station, the contract for the steam-raising plant having previously been awarded to International Combustion, Ltd., whose quotation was £238,450.

Displays by Blackburn (left) and Stoke Electricity Departments at local exhibitions

Local Exhibitions

One of the most attractive stands at the recent Blackburn Industrial Exhibition was that of the Corporation Electricity Department, which had a well-arranged display of domestic appliances, electric signs and radio equipment. The stand occupied a large portion of the foyer, and the Department is very satisfied with the results achieved. A portion of the stand is shown in the accompanying illustration.

An exhibition of "Better Things for the Home" was held

The contract for the boiler plant is one of the largest orders placed in this country for some time, and represents an entirely new departure so far as this country is concerned for boilers of this size, in that a hitherto practically unmarketable fuel—anthracite duff—is to be burnt in pulverised form. The volatile content is only from 6 to 8 per cent. The "Lopulco" system will be used on the storage principle, and will incorporate four Harding mills, each having a capacity of ten tons per hour, while air preheated to 700 deg. will be used.

Wages in the Electrical Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry informs us that the October 1st cost-of-living figure was 43 per cent. above the 1914 level and that this will not involve any alteration in wages on the third pay day in November.

New G.E.C. Premises at Stoke

The Lord Mayor of Stoke-on-Trent (Ald. Miss F. A. Farmer) formally inaugurated the new offices and showrooms of the General Electric Co., Ltd., at Magnet House, South Wolfe Street, Stoke-on-Trent, on October 20th. This is the thirtieth branch of the G.E.C. and it will operate under the supervision of the Birmingham branch. It will serve the whole of the North Staffordshire area, including the Potteries district, and will carry large stocks of the company's products. The ground floor has been designed as a showroom, in which are displayed lighting fittings, domestic appliances and radio apparatus. The ceremony was preceded by a luncheon at the North Stafford Hotel, at which Mr. F. Boyes, manager of the company's Birmingham branch, presided, supported by Mr. H. W. Roberts, director and sales manager of the G.E.C. The new branch will be under the control of Mr. J. Jackson.

A portion of the new G.E.C. showrooms at Stoke-on-Trent

New Australian Companies

Among companies recently registered in Sydney are: Kolster Radio (Australasia), Ltd. (capital £1,000), radio, electrical and refrigerating engineers, &c.; Widdis Diamond Dry Cells Proprietary, Ltd. (capital £10,000), dry cell manufacturers; and the Electron Co. of Australia, Ltd. (capital £10,000), electrical manufacturers.

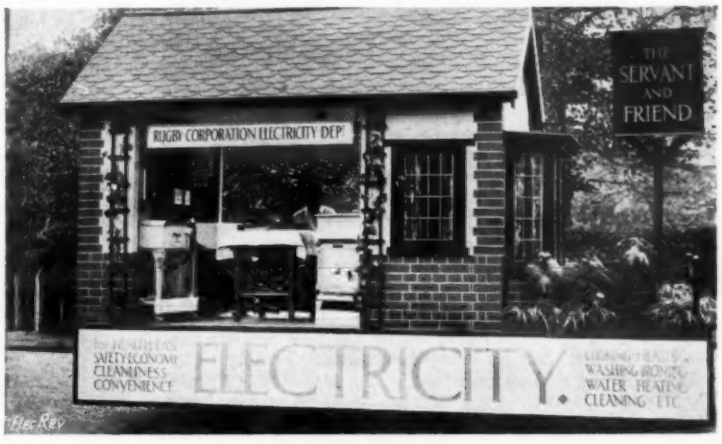
New Municipal Showrooms

The Bury St. Edmund's Town Council has decided to establish an electricity showroom and estimates of the cost are to be furnished.

Electricity in Rugby Celebrations

During the recent celebrations at Rugby to mark the presentation of a Royal Charter to the borough, a carnival was held in which the Corporation Electricity Department entered a decorated lorry bearing a model electric kitchen with the appropriate slogan "Electricity—The Servant and Friend." The illustration reproduced with this note shows the attractive arrangement of the lorry; among the appliances shown can be seen a "Hotpoint" electric washing and wringing machine.

The British Thomson-Houston Co. also had three decorated lorries, one carrying a scale representation of the Rugby factory, above which was a model of the large synchronous motor described on page 635 of this issue; another bearing the well-known "Mazda Kilties," and the third a living tableau of the "Mazda" dancing girl.



A Rugby Tableau

Helping the Hotel Lighting Campaign

During the discussion on Mr. Ackerley's paper on hotel lighting at the Electric Lighting Service Bureau on October 19th, Mr. T. E. Ritchie (chief illuminating engineer of the G.E.C.) described a simple and practical method of assisting the Hotel Lighting Campaign. He said he had stayed at five different hotels since the campaign opened, and in each case, at the psychological moment of paying his bill, he had asked to see the manager, who, he found, was generally accessible when the question of payment arose. He had invited the manager to come into his bedroom, and on reaching it had pointed out the absence of a bedhead light. "I am one of the numerous people," he explained to the manager, "who like to read themselves to sleep, and until I get from you a letter stating that bedhead lights have been installed, I shall not return to your hotel." In two cases he has already been informed that the matter had now received attention and that the management was looking forward to his next visit. As thousands of electrical men spend the greater part of their lives in hotels, the industry possesses a formidable force which, if mobilised in this fashion, would have a decisive influence on hotel proprietors.

Baxter & Caunter's New Showrooms

Messrs. Baxter & Caunter, Ltd., have removed from Tottenham Court Road to larger premises at 33-37, Alfred Place, W.C.1. "Darnoc House" is more roomy in every way; on one side there is convenient access to the trade counter, which is now at the front on the street level, and on the other side there is a covered court into which lorries can be driven for loading goods, also on the street level, from the stores behind. The front half of the first floor is laid out as a showroom, the rear portion of the premises being devoted to office and administrative accommodation. Besides plant and installation equipment, a large range of fittings, accessories, "Raplite" switch and fuse gear, and domestic appliances of all kinds is supplied.

Battery Production in Canada

The production of storage and dry batteries in Canada last year reached a total value of $5,007,620, as compared with $6,712,080 in 1930, twenty-three factories being in operation. These plants employed a monthly average of 1,018 persons and the capital investment totalled $8,830,573.

For Sale

Ribchester Institution has lighting plant for disposal.
(See our advertisement pages to-day.)

Recent Contracts

The Central Electricity Board has placed with the Macintosh Cable Co., Ltd., in connection with the South-West England Scheme, an order for the supply, laying and jointing of 33-kV, 11-kV and 6.6-kV cables. The work will be carried out to the specification of Messrs. Kennedy & Donkin, and is valued at over £100,000.

Messrs. Yarrow & Co. have received an order from the Burmah Oil Co. for one of their latest improved water-tube type boilers which is to be manufactured at their Glasgow works and shipped in pieces for re-erection in Burmah. The boiler is designed for a normal evaporation of 25,000 lb. per hour, an overload evaporation of 31,000 lb. per hour, a working pressure of 190 lb. per sq. in., and a steam temperature of 500 deg. F. It will be supplied complete with Yarrow oil-burning equipment and a Yarrow airheater, the furnace being designed with double steel casings between which the combustion air passes so that the refractories lining the furnace are efficiently cooled.

Approximately 200 of the 248 houses included in the Gloucester housing scheme have now been wired by Messrs. Beaven & Sons, and it is anticipated that the whole of the work will be completed before the end of the year. All the installation equipment has been supplied by the Gloucester branch of the General Electric Co., Ltd. The same contractors have just secured the contract for the equipment of the Findlay Road Schools for the Gloucester Corporation.

Further Australian Tariff Inquiries

The Australian Tariff Board has held inquiries into the duties on electric fans and wireless receivers and parts. Regarding electric fans, local manufacturers asked for increases from "free, British preferential tariff," and "25 per cent. general," to 15 per cent. and 50 per cent. respectively. Mr. B. H. Keogh, manager of the Electrical Engineering and Construction Co., Pty., Ltd., said that as a result of tests his company evolved in 1930 a method of economical mass production of electric fans, and contended that it was possible to manufacture these in Australia as economically as elsewhere. Local labour and material accounted for 81 per cent. of the company's production; British products, which could not be obtained in Australia, for 13 per cent.; and foreign products for 6 per cent. They were receiving no protection on account of depreciated British currency or exchange, and if overseas firms could carry these

charges they would subject the company to unfair competition. The value of imported fans in 1928-29 was £42,364; in 1929-30, £55,705; and in 1930-31, £17,322. Normal requirements were 14,000 fans a year, valued at £30,000. With legitimate competition from Great Britain a duty of 15 per cent. would be adequate, as the company did not seek prohibition. Mr. S. F. Ferguson, federal secretary of the Australian Association of British Manufacturers, said that a 15 per cent. British preferential duty would place the British manufacturer at a serious disadvantage. Although exchange and primage charges were temporary, they were likely to remain long enough to enable the local manufacturer to establish his product and progressively to reduce his production costs.

At an inquiry into duties on radio equipment it was stated by Mr. K. J. Corridon, of Firth Bros., Pty., Ltd., Melbourne, that failing the maintenance of the present duties they should be reduced to a level at which importation would be facilitated. His principals, he said, made more money as importers than as manufacturers, and if the duties were reduced they would be unable to carry on as manufacturers. Mr. A. H. Friedman, sales manager of Stromberg-Carlson (Australasia), Ltd., Sydney, said the fact that nine leading American companies had withdrawn from the radio field showed that the prices of American receivers had been, and still were, so low as to be economically unsound.

Trade Announcements

Messrs. T. Barratt & Co., electrical and radio dealers and contractors, have opened new premises at the corner of Mill Street and Station Street, Sutton Coldfield. The telephone number remains unchanged.

Messrs. Young & Wildsmith, 35, Little Russell Street, New Oxford Street, W.C.1, have been appointed sole selling agents for "Crown" cables, flexibles and wires.

Superlamp, Ltd., is to open a new branch next Tuesday at 6, Bond Street, Ealing, W.

German Orders Lost to England

In connection with the celebration of the eighty-fifth year of the existence of the Siemens and Halske Co., Herr Carl von Siemens recently delivered a speech on industrial and political questions, and made special reference to the present policy of Germany. In this connection he mentioned that during the past few days reports had again been received from the company's offices in Sweden, Denmark and Holland that orders intended for the company had been placed partly in England at higher prices.

Catalogues Required

Mr. George Melville, electrical contractor, 73, Coleshill Street, Sutton Coldfield, Birmingham, asks for manufacturers' catalogues and price lists.

New Ediswan Lamp Branches

New stores have been opened by the Edison Swan Electric Co., Ltd., at 18, Bedford Street, Norwich, Crown Hall Cham-

The Ediswan Norwich depôt

bers, Hyde Park Corner, Ipswich, and 24, Peel Place, Leeds Road, Bradford, for the distribution of "Royal Ediswan" lamps in these areas. We reproduce, herewith, a photograph of the new depôt at Norwich.

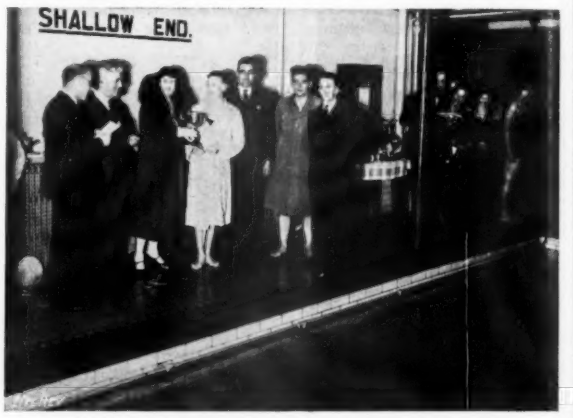
Ferranti Set Wins Manchester Trophy

As a result of a ballot organised by the *Manchester Evening Chronicle* in conjunction with the local wireless retailers' association, the *Evening Chronicle* trophy for the "best value for money" set shown at the Manchester Radio Exhibition was awarded to Messrs. Ferranti, Ltd., for their superheterodyne receiver.

Social Events

The fourth annual swimming gala of the Standard Telephones and Cables Athletic and Social Club was held on October 20th at the Holborn Baths. Despite the inclement weather there was an excellent attendance, and the visitors were well repaid by an attractive and varied programme of twenty-five events. The spirit of rivalry between the head office, New Southgate, Woolwich and Hendon branches of the company was infectious and the close finishes to many of the races aroused considerable enthusiasm. The various events were interspersed with exhibitions of fancy diving and swimming by well-known swimming clubs and a water polo match in which a number of champion swimmers took part. At the conclusion of the programme the prizes were distributed by Mr. E. S. Byng, who is president of the Social Club.

The Henletel Swimming Club, of Henley's Head Office Social Club, held its third annual gala at Holborn Baths on October 21st. Among those present were Mr. and Mrs. A. E. Salmon, Mr. and Mrs. E. Lefeaux, Mr. and Mrs. P. Dunsheath, Mr. and Mrs. McArthur, and Mr. G. E. Rhodes. Mr. W. F. Bishop



Prize winners at Henley's swimming gala

was unavoidably prevented from attending. All the events were keenly contested, while features of the evening were a diving display by Messrs. A. S. Brewer and C. Hollister, and a display of life saving and ornamental swimming. The evening concluded with a farce "Ye Olde English Tourney," after which the prizes were presented by Mrs. Salmon, who is seen in the accompanying illustration.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, Etc.	Price Oct. 26th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£17	—
a Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3 15s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, Etc.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£144	£2 inc.
Grade II ... ... ,,	£101	£1 inc.
Grade III ... ... ,,	£55	—
c Brass (rolled metal 2" to 12" basis)... per lb.	7¼d.	—
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9½d.	¼d. dec.
c ,, Wire, basis ... ... ,,	7⅝d.	—
c Copper Tubes (solid drawn) ... ... ,,	10d.	¼d. dec.
g ,, Bars (best selected) ... ... per ton	£65	£3 dec.
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
g ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets ... ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£42	—
d ,, ,, H.C. Wire ... per lb.	6¼d.	⅛d. dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4¼d.	¼d. dec.
i Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i ,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£13 15s.	—
g Mercury ... ... per bot.	£9 10s. to £9 17s. 6d.	2s. 6d. to 5s. inc.
e Mica (in original cases) small ... per lb.	6d. to 8/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	10¾d.	—
p ,, ,, rolled strip & sheet ,,	10¾d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
o Platinum ... ... per oz.	£9 10s.	5s. inc.
d Silicium Bronze Wire... ... ... per lb.	7½d.	⅛d. dec.
r Steel, magnet, in bars... ... ... ,,	7½d.	—
g Tin, Block (English) ... ... per ton	£154 to £156	£3 10. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co. Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Iron and Steel Duties

The Treasury, on the advice of the Import Duties Advisory Committee, has made an Order continuing for a period of two years the duties (33⅓ per cent.) now in force on iron and steel.

French Electrical Imports and Exports

The French imports and exports of electrical machinery, apparatus and cognate goods during the six months ended with June last as compared with the corresponding half of 1931 are shown in the appended tables. The values are given in thousands of francs.

	January—June. 1932. 1,000 Francs.	Decrease. 1,000 Francs.
IMPORTS :		
Dynamo-electric machinery and transformers...	43,968	38,261
Telegraph, telephone and other apparatus	121,465	34,544
Dynamo and motor parts	63	39
Incandescent lamps	37,830	13,136
Arc lamps and parts.....	171	218
Carbons for electric and industrial purposes.....	4,390	1,929
Electric wires and cables	4,387	7,009
Parts of electrical apparatus	8,830	7,473
Magnets other than electro-magnets.....	674	497
Accumulators and parts	1,896	2,020
Dry batteries and condensers	5,260	1,961*
Porcelain and other insulators	1,617	1,006
Total	230,551	104,171
Total at 87¾ fr. to the £	£2,627,360	£1,187,135

	January—June. 1932. 1,000 Francs.	Decrease 1,000 Francs.
EXPORTS :		
Dynamo-electric machines and transformers ...	26,191	15,692
Telegraph, telephone, and other apparatus	46,427	45,358
Dynamo and motor parts	1,030	985*
Incandescent lamps	10,001	4,805
Arc lamps and parts.....	373	1,043
Carbons for electrical and industrial purposes...	8,435	2,083
Electric wires and cables	12,634	16,634
Parts of electrical apparatus.....	14,555	6,039
Magnets other than electromagnets	223	110*
Accumulators and parts	6,700	8,633
Dry batteries and condensers	2,191	371
Porcelain and other insulators	5,521	4,591
Total	134,281	104,154
Total at 87¾ fr. to the £	£1,530,265	£1,186,945

* Increases.

New Catalogues and Lists

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Illustrated leaflets on protective and reverse power relays.

Cresswell Manufacturing Co., 31 and 32, Tower Street, Birmingham.—Leaflet No. 41, illustrating and describing the company's electric branding iron.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.—A folder (No. 665) relating to "Full o' Power" pocket and torch batteries which is available for overprinting.

Tangyes, Ltd., Cornwall Works, Birmingham.—Catalogue No. 442, containing particulars of selected types of hydraulic machinery manufactured by the company.

Philips Industrial, 145, Charing Cross Road, W.C.2.—Publications Nos. B.302 and B.405, on the "3 in 1" battery charger and public address equipment, respectively.

Brook Motors, Ltd., Empress Works, Huddersfield.—An abridged stock list (No. 339) of a.c. motors.

British Fan & Electric Co., 21, Mount Pleasant, Rosebery Avenue, W.C.1.—A list giving prices and particulars of a.c. and d.c. exhaust fans.

Engineering & Lighting Equipment Co., Ltd., Sphere Works, St. Albans.—A folder illustrating examples of the company's industrial lighting fittings and equipment.

Cuthbert Andrews, 47, Red Lion Street, W.C.1.—A pamphlet describing "Protex" lead glass for X-ray protective purposes.

British Insulated Cables, Ltd., Prescot, Lancs.—Publications Nos. C.1.G., C.2.Q. and C.2.S., relating respectively to jointing materials; paper pinions, ceiling fans and varnishes; and dynamo and instrument wires.

Henderson Electrical & Wireless Service, 54, Queen's Road, Brighton.—A 120-page catalogue of radio receiving sets, components and accessories.

Donovan & Co., 46/47, Great Charles Street, Birmingham.—A revised edition (publication No. 3210) of the company's previous pamphlet, illustrating flexible metallic conduit and solderless couplings.

Holden & Brooke, Ltd., Sirius Works, West Gorton, Manchester.—A guide to the company's manufactures, with a list of branch offices and agencies.

Harland & Wolff, Ltd., Queen's Island, Belfast.—An illustrated booklet (publication No. 322) containing particulars of stationary Diesel engines of the trunk, piston, airless injection type, for driving electric generators, &c.

Callender's Cable & Construction Co., Ltd., 2, Surrey Street, Strand, W.C.2.—Pamphlet No. 120, dealing with inverted outdoor dividing boxes for l.p. cables.

Lancashire Dynamo & Crypto, Ltd., Trafford Park, Manchester.—A leaflet relating to motors and generators for the Canadian market.

Electrical Equipment & Carbon Co., Ltd., 107/111, New Oxford Street, W.C.1.—A pamphlet giving full details of a new "Megometer" insulation testing set.

Mullard Wireless Service Co., Ltd., Charing Cross Road, W.C.2.—Leaflets relating to the 904V and P.M.24M valves.

Bankruptcy Proceedings

A. Roberts, also known as Captain de Villiers and J. Brown, and described in the receiving order as Arthur de Villiers, trading as the Castle Radio Manufacturing Co., wireless and electrical manufacturer and dealer, 161, Westminster Bridge Road, S.E.—A sitting of the London Bankruptcy Court was held on October 19th for the public examination of this debtor who was brought to the Court last April upon the petition of Messrs. V. Zeitlin & Sons, Ltd., with liabilities of £100, against assets of £880. The debtor stated that for many years he appeared on the stage as "Captain de Villiers," inventor and demonstrator of the wireless controlled airship. In 1921 he and his stage partner acquired a radio retail business at 161, Westminster Bridge Road, he being registered as the sole proprietor under the name of the Castle Radio Co. In March, 1931, he also commenced to manufacture wireless goods and he registered himself proprietor of the Castle Radio Manufacturing Co. The radio manufacturing and retail business came to an end last January. The debtor further stated that he formed or caused to be registered the Castle Trading Co., the Gresham Manufacturing Co., the National Federation of Radio Retailers, the Northern Federation of Radio Retailers, the Meteor Radio and Electrical Co., the National Radio Retailer, and Co-operative Radio, all of which (with the exception of the Gresham Manufacturing Co., which never functioned) had offices at 161, Westminster Bridge Road. He did not admit insolvency and attributed his present position to the action of the petitioning creditor. The examination was closed.

T. E. F. Spencer, radio dealer, 24, Nicholls Street, lately 40a, Paradise Street, West Bromwich, Staffs.—The first meeting of creditors was held on October 21st at the Official Receiver's Office, 159, Great Charles Street, Birmingham, when the statement of affairs showed gross liabilities of £596 and a deficiency of £524. The debtor stated that he commenced business on his own account in February, 1930, with a capital of £5. For the first six months of the trading he over-bought, and owing to subsequent reductions in prices he got into debt. The case was left in the hands of the Official Receiver as trustee.

H. A. Mayhew, electrical contracting engineer, 96, London Road, Apsley, Hertfordshire, and 30, Elmer Gardens, Edgware, Middlesex.—The receiving order was made on the debtor's own petition recently, and according to the statement of affairs filed the gross liabilities amount to £1,399, of which £470 is expected to rank for dividend. The net assets are £106, and there is a deficiency of £363. Debtor attributes his position to bad debts and insufficient margin of profit to cover overhead expenses. When the public examination was held recently the hearing was adjourned.

J. Hiller, electrical and radio dealer, 76, lately 52, Whitechapel Road, E.—The public examination was held on October 20th at the London Bankruptcy Court, the accounts showing liabilities of £816 and no available assets. The debtor attributed his insolvency to heavy overhead expenses, losses by breakage and pilfering, depreciation in value of stock, loss on the sale of a motor car and van, law costs and lack of capital. The examination was concluded.

G. A. Laird and **D. Hyde,** The Cot, Meriden, near Coventry (trading as Burbury, Laird & Co.), electrical engineers, 6, Warwick Row, Coventry.—The public examination was held recently at the Coventry Bankruptcy Court before Mr. Registrar Kirby. The estimated deficiency was £2,276, the failure being attributed to lack of capital and bad trade. The examinations were closed.

J. Moston (Stone Electrical Supply Co.), Barlaston Old Road, Barlaston, Staffs.—Last day for receiving proofs for dividend November 3rd. Mr. P. M. Milward, Official Receiver and trustee, 12, Lonsdale Street, Stoke-on-Trent.

F. G. Simcock, electrician, "Ferndale," Balcarres Road, Leyland.—Public examination November 18th at the Court House, Quay Street, Manchester.

J. M. Kelly (Norton Electric Co.), wireless manufacturer, 13-14, The Broadway, Deptford, S.E.—Application for discharge to be heard November 11th at Bankruptcy Buildings, Carey Street, W.C.

Company Liquidations

Alfred Wiseman, Ltd.—Particulars of claims by November 26th to the liquidators, Messrs. W. J. Edwards and F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham.

Bere Alston & District Electric Supply Co., Ltd.—Particulars of claims by October 31st to the joint liquidator, Mr. J. H. Brown, Station Road, Bere Alston.

Betta Electric Motors (Foreign), Ltd.—Winding up voluntarily. Liquidator, Mr. P. E. Slack, 44, Bedford Row, W.C. Particulars of claims by November 30th to the liquidator.

Wallingford & District Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Fraser.

Winding-up Petition Postponed

Victory Valves, Ltd.—In the Companies Court on October 24th Mr. Justice Bennett had before him a petition for the compulsory winding-up of Victory Valves, Ltd.

Counsel said that since the petition had been presented a resolution had been passed for the voluntary winding-up of the company. Counsel for a creditor said that was "rather startling."

His Lordship directed the matter to stand over.

Private Arrangement

A. J. Jackman (trading as Jackson's Wireless Service), 126, High Road, South Tottenham, N.15.—The creditors were called together recently at the offices of the Radio and Gramophone Trades Guardian Association, 78, New Oxford Street, W.C. It was reported that the liabilities amounted to £634, while the assets totalled £146. After allowing £33 for preferential claims the net assets were £113. A resolution was passed in favour of the matter being dealt with under a deed of assignment to Mr. Latham, subject to a cash claim of £150 being withdrawn.

Dissolutions of Partnership

T. S. Radio Sales Co., radio dealers, 179, Wardour Street, W.—Messrs. G. Tatham and C. A. W. Sowerbutts have dissolved partnership.

Electrical Efficiency Service, electricians, 22, Newark Road, Luton.—Messrs. J. W. Cockram and F. Dudley have dissolved partnership. Mr. Cockram will attend to debts and carry on the business.

Meeting of Creditors

General Accessories Co., Ltd.—A meeting of unsecured creditors will be held on October 31st at Euston Hotel, N.W., for the purpose of considering and, if thought fit, approving a scheme of arrangement between the company and these creditors.

Electricity Supply

Lighting, Domestic, Power

Barnsley.—SUPPLY TO WORSBOROUGH.—The Town Council has decided to give the necessary twelve months' notice to terminate at the end of 1933 the agreement with the Yorkshire Electric Power Co. with regard to the electricity supply in Worsborough.

Beckenham.—CHEAPER ELECTRICITY.—The Urban District Council has made the following reductions in charges: All-in two-part tariff: Winter quarters only, "unit" charge from 1¼d. to 1d. All-in two-part tariff, with use of cooker and water heating: Summer quarters, from ¾d. to ½d. per kWh; winter quarters, ⅝d. to ¾d. Shop heating: Winter quarter only, from 1¼d. to 1d. per kWh. Business premises: Winter quarters only, from 1¼d. to 1d. per kWh.

Beauly.—CHANGE-OVER.—The Beauly Electric Supply Co., Ltd., is to apply for consent to alter the system and pressure of the supply from two-wire d.c. at 240 V, to a.c. at 400 and 250 V.

Bexhill-on-Sea.—NO SUPPLY FOR PEBSHAM ESTATE.—The Town Council has decided that the probable revenue does not justify the provision of a supply to the Pebsham Estate.

Birkenhead.—EXTENSIONS.—The Electricity Committee is to lay a feeder from New Ferry to Eastham costing £7,762, and provide a sub-station in Cleveland Street at a cost of £3,000.

Bowland.—OVERHEAD LINES.—The Rural District Council has granted permission to Clitheroe Town Council to erect overhead lines in the Mitton and Waddington district.

Bradford.—INCREASED CONSUMPTION FOR POWER PURPOSES.—The departure from the gold standard and the imposition of the original import duties on wool textile goods are held responsible for an increase of nearly four million kWh in the consumption of electricity for motive power purposes during the last financial year's operation of the electricity undertaking. In the Electricity Department's annual report it is stated that this increase is the greatest recorded for this class of supply in any year since the War. A net increase of 2,098 in the number of consumers was slightly lower than that for the previous year; consumers of all classes now number 35,983.

Burwash.—PETITION FOR SUPPLIES.—The Parish Council has received a petition requesting it to use its influence to induce the Weald Electricity Supply Co., Ltd., to extend cables in the district. The petition has been forwarded to the company.

Cockermouth.—SUPPLY INAUGURATED.—The public supply of electricity provided by the Mid-Cumberland Electricity Co., Ltd., was inaugurated on October 15th by Mr. J. H. Pears, chairman of the Urban District Council. Immediate extensions are to be made to Maryport, Wigton, Silloth, and in the Penrith district.

Continental.—FRANCE.—*Reuters' Trade Service* (Paris) reports that attention is being paid to the prospect of utilising the waters of the Massif Central (the mountainous region in the centre of France) for the development of electricity. Not only is there an abundant supply of water available, but the comparatively small distance from Paris enables electricity to be supplied under more favourable conditions. It is estimated that from this region more than two thousand million kWh of electrical energy could be produced annually, nearly half of which would come from the Truyère. This river enters at Sarrans, a narrow gorge, from which it emerges, after falling 200 m., 13 km. lower, at Brommat, where it is joined by the Bromme. It is here that the Société des Forces Motrices de la Truyère has already completed important works. A dam is now under construction at Sarrans, at the head of the gorge. It will be 220 m. across and 105 m. high, the highest in France. This dam will form a reservoir having an area of 1,000 hectares and a capacity of 300 million cu. m. At the foot of the dam there will be the Sarrans power station, which is expected to be in operation by October, 1934, and will have a capacity of 100,000 kW.

The Compagnie Nationale du Rhône has been formed at Lyons under the presidency of Senator Perrier, formerly French Minister of Public Works, for the purpose of rendering the Rhône navigable from the Swiss frontier to the Mediterranean, and to establish hydro-electric works capable of yielding 560,000 h.p. The expenditure on the first part of the works is estimated at 2,400,000,000 fr.

CZECHO-SLOVAKIA.—Of the 15,423 parishes and townships in Czecho-Slovakia, 8,338 are now provided with supplies of electricity, and the power network is being steadily extended. Several new hydro-electric power stations are at present in course of construction; they include the important ones at Stechovice on the Vitava, Strekov on the Elbe (Bohemia), Vranov on the Dyje (Moravia), Ladce on the Vah (Slovakia), and near Uzhorod on the Uz (Carpathian Ruthenia).

ITALY.—Two hydro-electric power stations have recently been completed on the River Sagittario for the supply of power for the electrified State railways in central Italy. The larger of the two stations works under a head of 1,075 ft. and comprises three 15,000-h.p. Pelton turbines and generators.

RUSSIA.—The first automatic power station in the U.S.S.R. has just been completed in Erivan. This station has a capacity of 2,400 kW and will be operated from a point 2 km. distant. It is anticipated that the 500,000-V experimental transmission line, which is being built at the outskirts of Leningrad, near the Electro-physical Institute, will be completed and tested at the beginning of next month.

Cotgrave (Notts).—A SUPPLY BEFORE CHRISTMAS.—It is expected that the Derbyshire & Nottinghamshire Electric Power Co. will have made a supply available for the village before Christmas.

Crieff.—CHEAPER ELECTRICITY.—It is reported that the Scottish Power Co., Ltd., of which the Crieff Electric Supply Co., Ltd., is a subsidiary, is to reduce the price of electricity in Crieff from 10d. to 8d. per kWh.

Croydon.—CINEMA INSTALLATION.—The Electricity Committee is to provide a supply of electricity, at a cost of £650, to the State Cinema now in course of construction by Mr. A. C. Matthews in London Road, Thornton Heath.

ELECTRICITY FOR WADDON FACTORY ESTATE.—Arrangements have been made to supply various buildings on Waddon Factory Estate.

Dalbeattie.—NO OPPOSITION TO COUNTY COUNCIL'S ORDER.—The Town Council has agreed not to oppose the Provisional Order being promoted by Dumfries County Council for an electricity distribution scheme.

Eastbourne.—COOKER HIRING.—In order to facilitate the hiring of reconditioned electric cookers, the Electricity Department is to include an electric iron in the equipment at no extra charge.

Eccles.—MAINS EXTENSIONS.—The Electricity Committee is to apply for sanction to a loan of £8,000 for mains extensions.

Fort William.—PROTEST AGAINST DEPOSITS.—The Town Council is supporting a protest by tenants of Corporation houses against a demand by the Fort William Electric Lighting Co., Ltd., for a £2 deposit for installing electricity. The Council has decided to inform the company that the deposit was not considered necessary but in any case should not exceed 15s.

Haslingden.—ILLUMINATION OF MARKET.—The electrical installation at the covered markets now in course of erection is to be carried out by the Corporation Electricity Department. This is the first time that the Corporation has engaged in private installation work.

Healeyfield (Co. Durham).—CHEAPER ELECTRICITY.—The North-Eastern Electric Supply Co., Ltd., has informed the Parish Council that it intends to reduce electricity charges at Castleside from the beginning of 1933. The charges will then be 6d. per kWh primary rate (instead of 7d.) and 7d. for prepayment consumers (instead of 8d.).

Heywood.—REDUCED CHARGES.—The following reduced charges for electricity have been decided upon by the Electricity Committee:—Lighting flat rate, 5d. per kWh; "unit" charge under all-in tariff, ¾d.; heating and cooking, 1d.; cinema lighting, 3½d.; cinema power, 2½d.

Inverness.—REDUCED CHARGES.—The following revised scale of charges for electricity have been made by the Electricity Department:—Power and heating: 1¾d. per kWh. Domestic tariff: 15 per cent. of rateable value, plus ¾d. per kWh consumed (minimum £2 per annum). Contract tariff for shops, hotels, workshops, &c.: A fixed charge per kW connected plus 1¾d. per kWh (minimum £2 per annum). Reductions have also been made in hire and hire-purchase charges for domestic appliances.

Kettering.—STANDARDISATION OF SUPPLIES.—The electrical engineer is to submit a report on the question of the desirability of furnishing a three-phase supply of electricity to all villages.

REQUESTS FOR ELECTRICITY.—The Electricity Committee has received a communication from the Oxendon Rural District Council inquiring as to the possibility of electricity being supplied to the parishes of Ashley, Sutton, Weston and Marston Trussell. The electrical engineer is to submit an estimate of the capital expenditure and the probable revenue.

Littlehampton.—APPLICATION FOR SPECIAL ORDER WITHDRAWN.—The Urban District Council has been informed that the Sussex Electricity Supply Co., Ltd., has withdrawn its application for the Littlehampton Electricity (Extension) Special Order, and in consequence the inquiry which was to have taken place to-day (Friday) will not be held.

Liverpool.—SUCCESSFUL OPERATION OF CLARENCE DOCK STATION.—Ald. F. Wilson, chairman of the Electric Power and Lighting Committee, stated last week that during the first six months of the current year there had been a saving on the whole undertaking of about £26,000, and it would be found at the end of the year that the new Clarence Dock station which had come fully up to expectations was among the most efficient stations in the country. Applications for supplies were steadily coming in and sales during the past nine months were 4.7 per cent. higher than in the corresponding period of last year. Under the assisted wiring scheme 3,700 dwellings had been wired, an increase of 2,173 in the past twelve months.

DOMESTIC CHARGES REDUCED.—The fixed charge to domestic consumers under the rateable value scale is being reduced from 5 to 3¾ per cent.

London.—STOKE NEWINGTON.—The Electricity Committee recommends that wash-boilers be issued to approved applicants who have electric cookers under the Council's cooker hire scheme or where cooker wiring is installed. No initial charge

is to be made for the wash-boiler or for fixing, and the electricity consumed is to be charged for at 1½d. per kWh.

Application is to be made to the Electricity Commissioners for a Fringe Order authorising the Council to supply electricity to the Mayville Street sewage works, Islington.

REPAIR OF HACKNEY TRAMWAY SUB-STATION.—The London County Council Highways Committee recommends that, instead of having the whole of the plant damaged by a recent fire at the Hackney tramway sub-station repaired, two new rotary convertors, with starting equipment, &c., shall be purchased at a cost of £10,145 (including repairs to buildings and other plant).

ST. PANCRAS.—Sanction to a loan of £5,330 for e.h.p. mains has been received and the Electricity and Public Lighting Committee is now applying for permission to borrow £69,007 for electricity purposes. Mains extensions are to be carried out at a cost of £2,490.

STEPNEY.—The expenditure of a further £6,000 on the assisted wiring scheme is recommended by the Electricity Supply Committee.

BATTERSEA.—The Electricity Committee proposes to provide services to 203 premises at an estimated cost of £1,804.

HAMMERSMITH.—The Borough Council has received sanction to a loan of £14,383, the balance of £55,405 applied for for mains, services, &c.

Lowestoft.—THE CHANGE-OVER.—The Town Council has received sanction to a loan of £1,600 for the change-over in the northern portion of the borough.

Newcastle-upon-Tyne.—THE DUNSTON STATION.—We are informed by the North-Eastern Electric Supply Co., Ltd., that we were rather premature in announcing the date of the opening of the new Dunston station. Though the work is well advanced the company is not at present in a position to make any statement with regard to the official opening ceremony.

ELECTRICITY FOR COUNCIL HOUSES?—About four years ago the Corporation Housing Committee agreed that only gas should be supplied to 3,000 houses which were to be built. In response to numerous requests, however, the Committee has now decided to ask to be released from this agreement so that the latest batch of 734 houses may have electricity installed.

North Wales and South Cheshire.—STANDARDISATION OF WAYLEAVE RENTALS.—At a recent meeting of the North Wales and South Cheshire Joint Electricity Authority there was some discussion on the desirability of dealing with wayleaves in a systematic manner. Mr. J. Rankin (North Wales Power Co.) emphasised the necessity of standardised rentals for wayleaves. Mr. Arthur Hewitt, who presided, contended the time had come when the Authority should take steps to show that it was alive to the problem.

Norwich.—THE SUPPLY AREA.—The Town Council, after negotiating for the transfer of Freethorpe, Fishley, Upton, Moulton, Limpenhoe, and Southwood from the Norwich area of electricity supply to the Yarmouth area, has decided to retain the villages named in its own area.

Portland.—ELECTRICAL HEATING OF MUSEUM.—The electrical engineer has been asked to submit a scheme for heating the museum by electricity.

SUPPLY TO BORSTAL INSTITUTION.—The Electricity Committee has come to terms for the provision of a supply to the Borstal Institution.

Port Talbot.—EXTENSION SCHEMES.—The Corporation has received sanction to the borrowing of £24,858 for developing the electricity undertaking in the town and Bryn areas, and for the provision of public street lighting in the village of Bryn. These schemes form part of a large programme of extensions involving a total estimated capital expenditure of £51,000, and the complete designs for the civil and electrical engineering works were all prepared by the borough electrical engineer, Mr. C. Garfield Richards. The electricity supply for the extensions will be purchased in bulk in the village of Bryn and in the town area from the British Iron & Steel Co., Ltd. (Guest, Keen, Baldwins), and the town district will supplement its supply from the existing Diesel engine driven generating station. The contractors are: Messrs. Foley & Pengelly; the British Thomson-Houston Co., Ltd.; the Foster Engineering Co., Ltd.; Messrs. Erskine, Heap & Co., Ltd.; George Ellison, Ltd.; Parmiter, Hope & Sugden, Ltd.; Johnson & Phillips, Ltd.; and the Metropolitan-Vickers Electrical Co., Ltd. A section of the first stage of the scheme for the provision of a distribution system and public street lighting for the village of Bryn has been completed, and the supply was commenced on October 1st, when the ceremony of switching on the supply was performed by Councillor R. Evans.

Retford.—EXTENSIONS.—The Town Council has received sanction to loans amounting to £25,621 for electricity extensions.

Salford.—CO-ORDINATION OF GAS AND ELECTRICITY UNDERTAKINGS.—The establishment of a Light, Heat, and Power Committee to undertake the control of gas and electricity undertakings and public lighting in Salford is recommended to the Town Council by a Special Co-ordination Committee.

Seaham Harbour.—LOANS.—The Electricity Committee is to apply for sanction to loans of £2,000 for services and £1,000 for meters.

Southend-on-Sea.—LOANS SANCTIONED.—The Town Council has received sanction to loans of £10,000 for replacing and altering consumers' apparatus on the change-over, and £1,493 for work in connection with an a.c. supply in the Victoria Circus district.

Southport.—FLOODLIGHTING.—The Foreshore Committee has asked the electrical and gas engineers to prepare schemes for floodlighting at the Marine Gardens, and the Parks Committee is including £200 in next year's estimates for the provision of floodlighting apparatus.

South Shields.—METERS FOR ASSISTED WIRING SCHEME.—The Electricity Committee has received sanction to a loan of £3,000 for meters required for the assisted wiring scheme.

Swansea.—ELECTRICITY DEPARTMENT CRITICISED.—The Electricity Department was severely criticised at last week's meeting of the Town Council. Councillor Thomas James, chairman of the Electricity Committee, submitted the annual accounts which showed a record gross trading profit of £108,690, but a net profit of only £123. He commented on the difficult times and detailed the large amounts contributed to the rates in past years from the undertaking, mentioning that a total of £176,715 had been expended in works for the relief of unemployment since 1924. Ald. Edward Harris declared that the growth of capital expenditure accompanied by a decline in the reserve fund were factors which called for serious attention. During the past five years the profits had steadily decreased. "When you consider," he said, "that we have a capital investment in this concern of practically £1,500,000 and can only show £123 profit, it seems to me that the whole position ought to be most carefully considered." It was agreed to discuss the report at a special meeting.

West Lancashire.—ELECTRICITY FOR BICKERSTAFFE.—Arrangements are being made by the Lancashire Electric Power Co. to extend the mains to Bickerstaffe, where a supply will be available this winter.

Weymouth.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £950.

Wick.—EXTENSION SCHEME.—Negotiations are taking place with a view to the Town Council's extending its electricity supply scheme to Castletown and Thurso.

Worsborough.—CHEAPER ELECTRICITY FOR COUNCIL HOUSES.—The Electrical Distribution of Yorkshire, Ltd., has reduced the charge for electricity to Council houses from 6¼d. to 6d. per kWh, and there is also a reduction in the residential tariff.

Municipal Supply Undertakings' Results in 1931—32

Town.	Engineer's Name.	Income. 1930–31.	Income. 1931–32.	Working Expenditure. 1930–31.	Working Expenditure. 1931–32.	Profit (+) or Loss (−) 1930–31.	Profit (+) or Loss (−) 1931–32.	Sales of Electricity. 1930–31.	Sales of Electricity. 1931–32.
		£	£	£	£	£	£	kWh.	kWh.
Accrington	A. W. Clegg	81,080	85,175	41,737	40,249	+ 3,446	+ 6,989	17,853,263	19,042,674
Barrow-in-Furness ...	H. R. Burnett	101,456	106,555	61,318	61,972	+ 4,094	+ 7,798	19,071,412	21,148,710
Bexley	A. J. Abraham	—	45,058	—	24,615	—	+ 7,778	4,495,469	5,524,396
Bridlington	A. J. Beckett	34,159	34,195	17,864	18,212	+ 6,666	+ 7,235	1,972,394	2,028,298
Cannock	P. Wardle...	38,200	40,108	26,341	25,681	− 568	− 618	5,433,761	5,741,758
Edinburgh	E. Seddon...	732,694	719,655	514,074	525,402	+ 62,043	+ 52,603	131,852,893	145,325,706
Fleetwood	W. P. Lilwall	37,293	40,724	19,060	21,657	+ 6,101	+ 8,248	3,897,571	5,367,577
Halifax	E. A. Mills	196,041	195,973	93,644	99,559	+ 25,518	+ 19,361	32,317,629	34,211,725
Haslingden	P. Clegg	21,922	20,961	14,783	13,818	+ 1,414	+ 961	3,081,146	3,218,897
Islington...	A. P. MacAlister... ...	301,209	364,655	183,380	273,350	+ 50,666	+ 46,578	35,192,121	37,833,416
King's Lynn	C. W. Jackson	34,844	38,254	17,730	18,401	+ 4,217	+ 4,347	3,786,828	4,691,128
Lancaster	G. C. Milnes	60,076	69,479	35,505	38,899	+ 10,699	+ 11,157	11,475,812	14,353,259
Lytham St. Anne's ...	J. C. Fairchild	67,164	66,862	40,030	31,553	+ 312	+ 4,361	8,002,504	8,071,864
Mountain Ash	E. W. Jones	24,185	23,851	14,180	15,124	+ 6,610	+ 396	1,502,305	1,614,633
Newport	A. Nichols Moore	193,505	196,335	99,254	101,416	+ 145	+ 469	31,747,440	33,530,374
Portrush...	C. J. Macfarlane	4,927	5,070	1,990	2,270	− 163	− 21	150,832	170,039
Preston	J. F. Simpson	304,210	328,273	144,418	148,263	+ 17,598	+ 14,317	92,183,272	100,350,823
Southampton	W. G. Turner	282,806	301,838	156,128	156,995	+ 16,062	+ 21,774	40,736,561	43,771,825
Stafford	W. H. Robins	53,553	55,516	39,406	41,670	+ 3,749	+ 3,249	8,957,917	9,449,581
Stirling	W. R. Murray	19,872	21,042	14,553	14,005	+ 200	+ 857	2,082,765	2,233,301
Warrington	F. V. L. Mathias ...	141,803	143,671	85,661	92,942	+ 13,559	+ 9,721	24,206,390	25,967,256
Weymouth and Melcombe Regis	G. Nicolson	39,682	43,238	22,195	21,310	+ 1,185	+ 6,371	3,670,578	4,156,384
Worcester	C. M. Shaw	91,009	95,988	46,448	47,254	+ 8,691	+ 9,901	14,902,965	16,376,420

Traction

Birmingham.—Trolley-bus Scheme Delayed.—The proposals of the Salter Report on road transport have for the time being caused the shelving of the Corporation's scheme to provide trolley-buses in Coventry Road. The scheme had been approved and everything was ready for putting it into effect. The Corporation's estimates were based on the assumption that the tax would be £96 per vehicle, but the Salter Report called for a tax of £554. This would mean an increase of £22,900 a year in the operating expenses of the route. No orders have yet been placed for the trolley-buses.

Bootle.—Time Switches for Traffic Signals.—The Highways Committee has decided to invite tenders for time switches for switching on and off automatic traffic signals.

Burnley.—Formation of Joint Transport Authority.—A joint authority is being formed to manage the tram and bus undertakings at Burnley, Colne and Nelson. The agreement provides for the joint management of the undertakings from April 1st, 1933, for a period of five years.

Coventry.—Report on Transport Services.—When the Transport Department recently proposed to curtail certain services the City Council passed a resolution calling upon the Committee to undertake a comprehensive survey of the undertaking, and to make suggestions with regard to types of vehicles in use, fare stages, routes, and a reorganisation in the general management. In its report, the Committee states that it does not consider that the censure which seems to be implied by the resolution is justified, and the fact that the transport engineer (Mr. T. R. Whitehead) is due to retire in March next creates an obvious obstacle to undertaking at once the survey of policy for which the Council asks. The Committee suggests, therefore, that the best course is to make early arrangements for the selection of Mr. Whitehead's successor, and then to invite the new engineer to formulate suggestions of changes, if any, to be made in the general policy of the undertaking.

Dundee.—Modernisation of Tramcars.—Practically all the Corporation's tramcars have now been re-equipped and brought up to date.

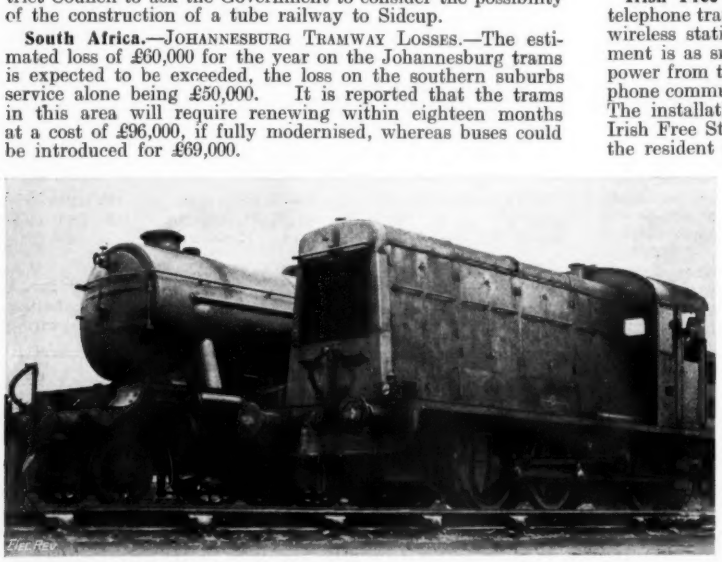
Llanelly.—Progress with Trolley-bus Scheme.—Good progress is being made with the conversion of the tramway system to trolley-bus operation, and it is expected that the change-over will be made before the end of the year.

Northern Ireland.—Belfast.—Twenty additional sets of traffic signals are to be installed.

Salford.—Trolley-buses.—A Bill is to be brought before Parliament by the Corporation providing for the operation of trolley-bus services.

Sidcup.—Council Asks for Tube Railway.—Overcrowding on the Southern Railway's line has prompted the Urban District Council to ask the Government to consider the possibility of the construction of a tube railway to Sidcup.

South Africa.—Johannesburg Tramway Losses.—The estimated loss of £60,000 for the year on the Johannesburg trams is expected to be exceeded, the loss on the southern suburbs service alone being £50,000. It is reported that the trams in this area will require renewing within eighteen months at a cost of £96,000, if fully modernised, whereas buses could be introduced for £69,000.



The Armstrong-Whitworth Diesel-electric locomotive in the foreground, although equipped with only a 250-b.h.p. engine, is claimed to be capable of carrying out all the duties previously performed by steam locomotives developing at least 400-h.p. The fuel costs work out at under 8d. an hour

South Shields.—Tramway Extensions.—The Tramways Committee proposes to extend the light railway from King George Road along Prince Edward Road to the Nook in Sunderland Road by means of a single line costing £1,500.

Wolverhampton.—Transport Services Curtailed.—As a result of the continued trade depression reduced services are now being run on a number of Corporation routes. The substitution of trolley-buses for petrol buses has, however, resulted in an improved service on the Penn route.

Communications

Great Britain.—Radio Relay Exchanges.—The Darlington Streets Committee has recommended the acceptance of a proposal by Rediffusion, Ltd., to establish a relay service for the town.

The Newton Abbot Urban Council has received applications from four companies, which have been referred to the Highways Committee for consideration. Each firm asked for a monopoly for a number of years.

The Westgate-on-Sea Parish Council has decided to take no action with regard to four applications, although the Kent County Council had offered no objection provided that no monopoly was granted.

The Lowestoft Town Council has decided to enter into an agreement with Home Radio (Lowestoft) for the establishment of a relay service.

The microphone apparatus on this Leeds tramcar enables the driver and conductor to give passengers information through loud speakers

The Walton-on-Thames Urban Council has refused to give Wireless Services, Ltd., permission to start a service.

Applications made by Wireless Service, Ltd., the National Broadcast Relay Co., and the Broadcast Listeners Service, Ltd., are to be considered by a committee of the Portland U.D.C.

The Paignton Highways Committee has informed Wired Wireless, Ltd., that permission to place wires across the highways will only be considered if application is made by the persons desirous of availing themselves of such a service.

Irish Free State.—Marine Radio-telephony.—A new radio-telephone transmitting set has been installed at the Malin Head wireless station, County Donegal. In appearance the instrument is as small as a portable receiving set, but, deriving its power from the station dynamos, it is possible to get into telephone communication with ships a thousand miles off the coast. The installation was carried out by Mr. J. Gallagher, of the Irish Free State Post Office Department, in co-operation with the resident engineer, Mr. M. O'Reilly.

Lanchester (Co. Durham).—Radio for Institution and Hospital.—The Poor Law Institution Committee is to install radio receivers at the institution and hospital. Tenders are to be invited.

Manchester.—Aerodrome Wireless Station.—The Marconi Company is to erect on behalf of the Air Ministry a wireless station at the Manchester Corporation aerodrome at Barton Moss for the use of civil aviation services. The station will have sufficient power and range to communicate with aircraft making the Irish Sea crossing to Belfast or Dublin, as well as over a wide area of north-west England and Wales, and the Midlands. It will provide ground-to-air communication by telephone or telegraph, meteorological broadcasts, wireless direction finding, and inter-aerodrome services. The installation will be completed by the spring of next year. The transmitting station will be erected about a mile from the aerodrome and remotely operated from the control room at Barton Moss. This is to obviate any possible danger to aircraft using the aerodrome on account of the two 100-ft. masts and the aerials of the transmitting station. The transmitter has been designed for an input of 3-kW and it will operate on wavelengths between 700 and 1,550 metres. Communication will be maintained on continuous wave or interrupted continuous wave telegraphy, or on telephony. The receiver will be of a similar type to that known as the Marconi R.G.14, for general communication and direction finding on the Bellini-Tosi system. The station will be staffed and controlled by the Air Ministry, and a complete meteorological office, which will send out periodical weather forecasts, is also to be established at the same time.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—December 13th. Post and Telegraph Department. Lead-covered switchboard cable. (A.X. 11545.)*
December 20th. Multiple-twin wire telephone cable. (A.X. 11537.)*
December 19th. City Council. Totally enclosed metal-clad 6,600-V switchgear. (A.X. 11544.)*
GRAFTON.—December 19th. Clarence River County Council. 1,000-kVA turbo-alternator set for Nymboida power station. Chief engineer and manager, Clarence River County Council, P.O. Box 5, Grafton.

Bolton.—November 7th. Corporation. Electrical installation at 416 houses and flats, &c., on the Johnson Fold Housing Estate. (October 21st.)

Bo'ness.—October 28th. County Council. Electric lighting installation at 92 houses, Newtown. Mr. A. M. Smith, sanitary inspector, Linlithgow.

Bridgwater.—November 28th. Corporation. Pumping machinery. Mr. E. A. Sandford Fawcett, 53, Victoria Street, S.W.1 (deposit £5 5s.).

Doncaster.—Corporation. Electric wiring in 250 houses on the Intake Estate. Mr. R. E. Ford, housing surveyor, 3, Priory Place.

Edinburgh.—November 9th. Corporation. Two electric ambulance lifts for the Western General Hospital. Mr. E. J. MacRae, city architect.

Egypt.—CAIRO.—December 10th. Ministry of the Interior. Diesel engines, alternators, switchgear, &c. (A. 11530.)*
December 17th. Overhead and underground distribution network for the town of Fikria. (A.X. 11552.)*
December 20th. Power station and overhead distribution network for the town of Fagus. (A.X. 11550.)*
December 14th. Ministry of Public Works. 32-kW oil engine driven generator set for the Marouf power station. (A.X. 11551.)*

Fleetwood.—October 29th. Electricity Department. H.p. and l.p. cables. (October 14th.)

Halifax.—October 31st. Town Council. Electricians' work at Northowram Hall Isolation Hospital. Mr. D. T. Lloyd Jones, borough engineer, Crossley Street (deposit £2 2s.).

India.—NEW DELHI.—November 17th. Flame-proof v.i.r. cables. (A.X. 11560.)*

Irish Free State.—DUBLIN.—November 7th. Dublin United Tramways Co. (1896), Ltd. Stores, including cables, car fittings, lamps, electrical fittings, &c. Mr. G. Marshall Harriss, general manager, 59, Upper O'Connell Street, Dublin (form of tender, 2s. 6d.).

Manchester.—November 5th. Electricity Department. Substation switchboards and water-softening plant. (October 21st.)

Newcastle-upon-Tyne.—November 23rd. Corporation. One 30-ton and one 5-ton electric travelling gantry cranes. City engineer, Town Hall.

South Africa.—JOHANNESBURG.—November 12th. City Council. Time switches. (A.X. 11557.)*
December 19th. South African Railways and Harbours. Manual telephone exchange for Durban. (A.X. 11558.)*

Straits Settlements.—SINGAPORE.—November 15th. Municipal Council. Sewage pumps, electrical equipment, &c. (G.X. 11920.)*

Swansea.—November 14th. Electricity Department. Structural steelwork for Tir John North power station. Messrs. Preece, Cardew & Rider, 8, Queen Anne's Gate, S.W.1 (deposit £5 5s.).

Walsall.—November 10th. Transport Committee. Fifteen double-deck trolley-buses.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bootle.—Highways Committee. Accepted. Battery for "Orwell" electric vehicle (£204).—Chloride Electrical Storage Co.

Bradford.—Electricity Committee. Accepted. Switchgear for Sunbridge Road sub-station.—Bertram Thomas.

Croydon.—Highways Committee. Recommended. Traffic signals (£713).—Automatic Electric Co., Ltd.

Dundee.—Corporation Housing Committee. Accepted. Electric lighting installation at 84 houses (£511).—Stenson & Co.

Government Contracts.—The following contracts were placed by the various Government departments during September:—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).

Electric passenger car.—Greenwood & Batley, Ltd. Motor generators.—Metropolitan-Vickers Electrical Co., Ltd. Retubing motor coolers.—Metropolitan-Vickers. Transformers and circuit breakers.—Crompton Parkinson.

AIR MINISTRY.

Direction finding equipment.—Marconi's. Modification of generating set.—Haslam & Newton. Cockpit lamps.—G.E.C. Radio beam equipment.—Standard Telephones & Cables.

CROWN AGENTS FOR THE COLONIES.

Cable.—Siemens Bros. & Co.

POST OFFICE.

Telephonic apparatus.—G.E.C.; Phœnix Telephone & Electric Works; Siemens Bros. & Co.; Standard Telephones & Cables; Telephone Mfg. Co.

Cable.—B.I. Cables; Callender's; Henley's; Standard Telephones & Cables.

Leclanché cells.—Ediswan; Ever Ready Co.; Fuller Accumulator Co.; G.E.C.; Siemens Bros. & Co.

Loading coils.—Automatic Electric Co.; G.E.C.; Siemens Bros. and Co.; Standard Telephones & Cables.

Telephone cords.—London Electric Wire Co. & Smiths; Phœnix Telephone & Electric Works; Reliance Electrical Wire Co.; Standard Telephones & Cables.

Power equipment.—Power Equipment Co.

Electric lighting fittings.—Hailwood & Ackroyd; Revo Electric Co.

Recoating cases with ebonite.—Siemens Electric Lamps and Supplies.

Rectifiers.—Ediswan.

Insulated bronze wire.—Johnson & Phillips.

L.p. cables, Faraday Building, Queen Victoria Street, E.C.—Macintosh Cable Co.

L.p. switchgear.—Erskine, Heap & Co.

Telephone exchange equipment.—Leicester trunk exchange; Bassett (Southampton area): Siemens Bros. & Co. Leicester trunk and local exchange; London trunk exchange; Hounslow: Standard Telephones & Cables. Sub-contractors for Hounslow: Chloride Electrical Storage Co., for batteries; Crompton Parkinson, for motor generator sets; W. Jones & Co., for ringing machines. Leytonstone: G.E.C.

Telephonic repeater equipment.—Liverpool; Derby; Leeds: Standard Telephones & Cables. Canterbury: G.E.C.

Voice frequency telegraph apparatus.—Belfast telephonic repeater station; Glasgow telephonic repeater station; G.P.O. (West), E.C.: Standard Telephones & Cables.

OFFICE OF WORKS.

Switchgear, &c., Imperial College of Science.—Crompton Parkinson.

Inverness.—Town Council. Accepted. Installation of electric lighting in 24 houses (£182).—R. E. Ramsay.

London.—BATTERSEA.—Highways and Works Committee. Recommended. Four two-way three-light vertical signals (£227).—Automatic Electric Co., Ltd. Two two-way and four one-way three-light vertical signals (£72).—Revo Electric Co., Ltd.
L.C.C.—Central Public Health Committee. Accepted. Two electric lifts at St. Mary Abbot's Hospital (£1,510).—Evans Lifts, Ltd. Automatic cold storage plants at certain hospitals (£1,655, less 2½ per cent.).—John Kirkcaldy, Ltd. Wiring and fittings for electric lighting, power, telephones and fire-alarm system, St. Mary Abbot's Hospital (£1,467).—Alpha Manufacturing & Electrical Co., Ltd. Wiring and fittings for automatic telephone installation, Eastern Hospital (£1,042).—L. G. Tate & Co., Ltd.
ST. PANCRAS.—Contracts and Stores Committee. Recommended. Cables.—Hackbridge Cable Co., Ltd. (£2,884); Standard Telephones & Cables, Ltd. (£500); Metropolitan Electric Cable & Construction Co., Ltd. (£233).
STEPNEY.—Electricity Supply Committee. Recommended. One 5,000-gal. sump pump (£70).—Gwynnes Pumps, Ltd. L.p. d.c. switchgear for Limehouse sub-station (£2,450).—Electric Construction Co., Ltd. This was the lowest of eighteen tenders received for the switchgear, the highest tender being £3,352.

Seaham Harbour.—Housing Committee. Accepted. Wiring further Council houses (Schedule Rates).—Harrison Bros.

Southend-on-Sea.—Town Council. Accepted. Spare motor for trackless trolleys (£190).—Bull Motors, Ltd. Spare armature (£115), spare axles, transmission and steering gear (£370).—English Electric Co., Ltd. Tram points (£940).—Edgar Allen & Co. Wiring Pier Pavilion (£224).—W. Jay (Westcliff), Ltd. Electric heating apparatus for Pavilion (£314).—Barker, Young & Co., Ltd.

Whitehaven.—Town Council. Accepted. E.h.p. and l.p. switchgear and transformers (£1,293).—A. Reyrolle & Co., Ltd.

Forthcoming Events

Junior Institution of Engineers.—Friday, October 28th. Institution, London. 7.30 p.m. "Electrical Engineering as Applied to Theatres and Cinemas." Mr. R. Gillespie Williams.

Birmingham Electric Club.—Friday, October 28th. Grand Hotel, Birmingham. 7 p.m. "The Recording and Reproduction of Talking Pictures." Mr. V. M. Roberts.

Institution of Civil Engineers.—Tuesday, November 1st. Institution, London. 6 p.m. Presidential address by Sir Murdoch Macdonald.

Association of Mining Electrical Engineers (London Branch).—Tuesday, November 1st. Junior Institution of Engineers. 6.45 p.m. Presidential address by Mr. H. H. Spencer.

Institution of Heating and Ventilating Engineers.—Wednesday, November 2nd. Home Office Industrial Museum, S.W. 7 p.m. "Radiant Heat." Mr. A. F. Dufton.

Electrical Association for Women.—Wednesday, November 2nd. E.L.M.A. Lighting Service Bureau, 15, Savoy Street, W.C. 3 p.m. "The Charm of the Well-lighted Home." Miss D. Noakes.

Institution of Electrical Engineers.—Thursday, November 3rd. Institution, London. 6 p.m. "The Electric Lighting of Buildings." Mr. A. B. Read and Dr. J. W. T. Walsh. (*West Wales (Swansea) Sub-Centre.*)—Friday, October 28th. Electricity Offices, Swansea. 6 p.m. Chairman's address. Mr. J. W. Burr. (*London Students' Section.*)—Friday, October 28th. Institution, London. 6.15 p.m. "What of the Future? With Electro-farming as an Illustration." Mr. R. Borlase Matthews. Wednesday, November 2nd. 2.30 p.m. Visit to the Kodak Works, Wealdstone. Thursday, November 4th. Carr's Restaurant, Strand, W.C. 7.15 for 7.30 p.m.

Smoking Concert. (*North-Western Section.*)—Tuesday, November 1st. Engineers' Club, Manchester. 7 p.m. "The Electric Lighting of Buildings." Mr. A. B. Read and Dr. J. W. T. Walsh. (*East Midland Sub-Centre.*)—Tuesday, November 1st. College, Loughborough. 6.45 p.m. "The Electrical Industry—Parochial or National." Mr. H. Hooper. (*South Midland Students' Section.*)—Tuesday, November 1st. University, Birmingham. 7 p.m. "Mercury Arc Rectifiers." Mr. H. Rissik. (*North Midland Students' Section.*)—Tuesday, November 1st. Hotel Metropole, Leeds. 7.15 p.m. "The Control of Large Interconnected Systems." Mr. L. C. Leeson. (*Wireless Section.*)—Wednesday, November 2nd. Institution, London. 6 p.m. Chairman's address. Mr. L. B. Turner. (*Meter and Instrumental Section.*)—Friday, November 4th. 7 p.m. Chairman's address. Mr. R. S. J. Spilsbury.

Institution of Mechanical Engineers.—Friday, November 4th. Institution, London. 6 p.m. Thomas Hawksley lecture. "Atomic Projectiles and their Applications." Lord Rutherford.

Society of Chemical Industry (Chemical Engineering Group).—Friday, November 4th. Royal Technical College, Glasgow. 7.30 p.m. Joint meeting with the Glasgow Section. "Ceramic Insulators—Their Manufacture and Testing." Mr. C. S. Garland.

Institute of Marine Engineers.—Friday, November 4th. Grosvenor House, Park Lane, W. 7 p.m. Annual conversazione.

Physical Society.—Friday, November 4th. Imperial College of Science and Technology, S. Kensington, S.W. 5 p.m. Short papers.

Association of Mining Electrical Engineers (South Wales Branch).—Saturday, November 5th. South Wales Institute of Engineers, Cardiff. 6 p.m. "Some Criteria of Line Insulator Efficiency." Mr. R. C. Andersen.

Notes

The Electrical Trades' Benevolent Institution

Mr. R. P. Sloan, the president of the E.T.B.I., states that the response, which has so far been made to his appeal for support of the funds of the Institution, is quite encouraging, and he is indebted to a number of his personal friends for having increased their usual donations with a view to supporting him during his year of office. He would very much appreciate it if those who have not already subscribed would forward their subscriptions to the secretary of the Institution at an early date, so that by November 18th—the date of the Ball at Grosvenor House, Park Lane—it may be possible to gauge the position with regard to the Institution's finances for the current year. In view of the many eminent men connected with the electrical industry who are attending the Ball, Mr. Sloan trusts that there will be a large and representative gathering on that occasion.

The Royal Institution

The autumn programme of the Royal Institution includes four lectures on "Rays and Radiations," which will be given by Mr. E. N. da C. Andrade, D.Sc., Ph.D., at the Institution, 21, Albemarle Street, W., on November 1st, 8th, 15th and 22nd.

I.E.E. (Scottish Centre)

The annual dinner and ladies' evening of the Scottish Centre of the Institution of Electrical Engineers will be held on November 22nd at the Grosvenor Restaurant, Gordon Street, Glasgow. Tickets (17s. 6d. each inclusive) can be obtained from Mr. R. B. Mitchell, Convener of the Entertainments Committee, 74, Waterloo Street, Glasgow, or from Mr. J. Taylor, hon. secretary, at the same address.

The Grid in the South-West

The headquarters of the Central Electricity Board in South-West England is "Grid House," an adapted residence in Oakfield Road, Clifton, Bristol. At the rear of the house a control room is being built to deal with local transmissions in an area of 1,700 sq. miles. Foundations for the 4,000 latticed towers are being put down at the rate of 90 per week. In the River Severn district there are thirteen river crossings, necessitating towers from 130 to 300 ft. high. One of the Ferranti 132-kV transformers, weighing 100 tons, has just arrived at Portishead power station. It was transported on a special 80-ton railway truck, from which it was transferred by hydraulic jacks to a 32-wheel wagon with sixty-four rubber tyres. This wagon is said to be the largest and strongest road transport vehicle in the world.

Institute of Fuel

The sixth annual dinner of the Institute of Fuel was held on October 19th at the Connaught Rooms, W.C. Sir Hugo Hirst, Bart., presided over a gathering of about 550 members and guests. The toast of "The Fuel Industries" was proposed by Mr. C. Mitchell (chairman Dorman, Long & Co., Ltd.), who said that the coal consumed was only 5¼ per cent. less than in the prosperous year of 1913; while the electrical industry had gone ahead since that time, the output of the iron and steel and mining industries had fallen by 25 per cent. If coal was to retain its foremost position it would have to be treated and converted into more suitable forms of energy.

Sir Hugo Hirst (president of the Institute), responding, urged the coal industry to spend more money on research. He was confident that Britain would be as great an industrial country in the future as it ever had been. He presented the Student's Medal of the Institute to Mr. D. M. Forbes, and gave a sketch of the adventurous career of Mr. C. M. Schwab (president, Bethlehem Steel Corporation), and called upon Violet, Lady Melchett, to present Mr. Schwab with the Melchett Medal for his achievements in fuel economy.

Mr. Schwab said that every great invention in steel originated in Britain, but the development had taken place in the U.S.A., where manufacturers took more risks. They also concentrated on turning out single products continuously. England would be more prosperous, he believed, if only 20 per cent. of the mills were used for specialised work.

The toast of "The Visitors" was proposed by Mr. Geo. Ussher (International Combustion, Ltd.). The response was made by Mr. W. L. Cooper (commercial attaché, U.S. Embassy), who prophesied that within a few years heat would be merely a by-product from the treatment of coal. Sir Philip Dawson, M.P., proposing the health of the president, emphasised the necessity of research in every industry.

Faraday House Old Students

The twenty-fourth annual dinner of the Faraday House Old Students' Association was held on October 21st at the Savoy Hotel, when nearly 300 members and guests assembled under the chairmanship of Major C. E. Prince, O.B.E. Lt.-Col. K. Edgcumbe, in proposing the toast of "Faraday House and its Old Students," mentioned that the College had invented the "sandwich" system of training, and that of the one hundred students passing through the college in the year, all had found positions. Dr. Alexander Russell, F.R.S. (principal, Faraday House), gave the number of students in training as 380.

The health of "The Guests" was proposed by Mr. C. C. Paterson and Sir Hugo Hirst, Bart., and Sir Philip Dawson, M.P., responded. We refer to Sir Hugo's speech in our leading columns. Sir Philip said that the electrical industry was the only one not under a cloud, and even in Germany and America it was suffering less than others.

Mr. S. B. Haslam, proposing the health of the chairman, referred to Major Prince as the most versatile man he had ever known. He had considerable artistic gifts in addition to those scientific talents which had made him largely responsible for experiments that had made broadcasting possible. In responding, Major Prince expressed his belief that reason did not apprehend everything. The synthetic faculty now found in the arts would perhaps be combined later with the analytic, resulting in greater scientific achievements.

Amongst others present were the Earl of Rothes, Sir J. E. Petavel, Col. Sir Henry Lyons, Sir Philip Nash, Sir Robert Robertson, Dr. S. L. Pearce, Messrs. T. P. Wilmshurst, W. W. Lackie, and W. B. Woodhouse, Captain Donaldson, Col. Morcom, Messrs. Roger T. Smith, and Vincent de Ferranti.

Appointment Vacant

General clerk for Middleton Electricity Department.
(See our advertisement pages to-day.)

Educational

A course of industrial management has been arranged by Mr. W. R. Dunlop, 57, Gordon Square, W.C.1.
(See our advertisement pages to-day.)

The Electrical Engineers' Ball

The next Electrical Engineers' Ball will be held at Grosvenor House, Park Lane, W., on February 17th, the day after the annual dinner of the Institution of Electrical Engineers. Any surplus that may be available after defraying the cost of the function will be handed over to the I.E.E. Benevolent Fund, under whose auspices the function will in future be managed. In previous years the surplus has been divided between this fund and that of the E.T.B.I.

The Committee of the Fund will have the co-operation of the former Ball Committee, and the detailed arrangements for the forthcoming ball will be in the hands of an Executive Committee consisting of representatives of the Benevolent Fund and of the Ball Committee. The function will be on the same lines as those of previous years, and these have always been well attended. Arrangements regarding tickets will be made public later.

Opposition to Salter Report Proposals

It was decided at a meeting of the Council of the Municipal Tramways and Transport Association held last Friday strenuously to oppose the proposals contained in the Salter Report for greatly increasing duties on transport vehicles. For 50-seater vehicles the proposed new duties would be £500.433, as against the existing rate of £86.4.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

ARCALITE table cigarette lighter.
MIROBAR electric shaving mirror.
Machine for manufacturing cells for dry batteries, and specially for the purpose of wrapping and tying the dollies.
HELEY electric bowl fire.
RAYCROFT invisible ray apparatus.
EMPIRE battery charging switchboard.
NEON electric heater.
The address of BUCKERMAN & Co.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. T. L. Hale, previously at the head office of Messrs. Holden and Brooke, Ltd., Manchester, in charge of their heat, calorifier and heat transfer departments, has taken up an appointment at the company's London office at 562/564, Abbey House, Westminster, S.W.

Mr. J. S. Sarbutt

Mr. J. S. Sarbutt, who for some years has represented the British Electric Transformer Co., Ltd., in connection with its "Tricity" cooking and heating apparatus, has been appointed to a similar position by the Credenda Conduits Co., Ltd. ("Creda" cooking and heating apparatus). Mr. Sarbutt will operate from the company's London office, and will be interested in cooker developments in Southern and Eastern England.

Mr. Cecil Campbell, C.M.G., formerly Legal Counsellor at the British Residency, Cairo, has been appointed managing director of the Marconi Company of Egypt.—*Reuter.*

Mr. F. T. Bovington, junior engineer-in-charge, has been recommended by Hammersmith Electricity Committee for the position of engineer-in-charge at the electricity works.

Mr. A. W. Young, the resident representative of the Sun Electrical Co., Ltd., in Bristol, has been appointed manager of the company's new depôt at 137, Victoria Street, Bristol, which was opened on Monday last. This depôt will extend all the facilities of the "Sunco" electrical and radio service to the company's customers in the West Country. Mr. Young's private address will still be Kennington Road, Bath (telephone 7317).

Mr. A. W. Young

Col. H. C. Fraser received a presentation at the opening meeting of the North Midland Centre of the Institution of Electrical Engineers on Tuesday last in appreciation of his services as hon. secretary for the past six years.

Sir Arthur Preece is to be asked by the States of Guernsey to arbitrate on the purchase price of the Guernsey Electrical Co.'s undertaking, which *The Times* reports, the States have decided to "nationalise" as from August 6th next.

[*Yates and Henderson*

Mr. L. H. Crowther

Mr. L. H. Crowther, A.M.I.E.E., chairman of the Sheffield Sub-Centre of the Institution of Electrical Engineers, delivered his inaugural address to the members at the opening of the session on October 19th. Mr. Crowther was educated at Batley Grammar School and the Leeds University. He was a pupil electrical engineer with Messrs. F. W. Dickinson and Co., of Leeds, being associated later with Messrs. Wilson Hartnell and Co., of that city. After spending a few years in municipal supply work with the Hull Corporation, he was appointed chief assistant electrical engineer to Messrs. Cammell, Laird & Co., Ltd., and in July, 1931, took up his present position as electrical engineer to the English Steel Corporation, Ltd., at its Vickers and Grimesthorpe Works, Sheffield.

Mr. Magnus Volk, of Volk's electric railway fame, celebrated his eighty-first birthday on October 19th by addressing the Brighton and Hove Rotary Club at the Old Ship Hotel, Brighton, on some of the difficulties which he experienced in connection with the railway which he started in 1883. He detailed a number of other interesting electrical reminiscences. It is hoped to celebrate the jubilee of the railway on August 3rd next year.

Mr. C. A. Hopkins, general manager of the Sunderland Corporation Transport Department, who, as recorded in our last issue was recommended for the position of transport general manager to Blackpool Corporation, informs us that he has withdrawn his application for that position.

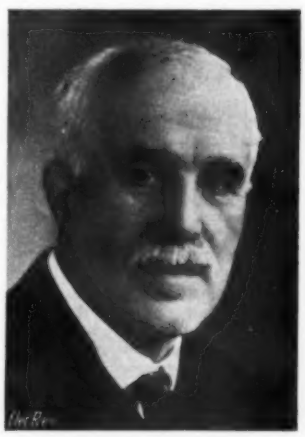
Obituary

Senator G. B. Pirelli.—The death occurred on October 19th at Varese (Milan) of Senator Giovanni Battista Pirelli, "Founder and President of the Pirelli Cable and Rubber Works." He was 84 years of age. A memorial service was held in London on Saturday morning at St. Peter's Church, Clerkenwell. Senator Pirelli, who was born at Lake Como, was of humble parentage, but he won a scholarship which enabled him to study industrial affairs in other countries. As the outcome he started manufacturing on a small scale and gradually extended his operations in the production of rubber goods, electrical cables, &c., until the name of Pirelli became famous throughout the world. The factory in Italy is on a very large scale and there are Pirelli factories and branches in many other places throughout the world. These include a factory at Manresa in Spain, a cable and rubber works in Brazil, a tyre factory at Burton-on-Trent, the well-known Pirelli-General works at Southampton, and so on. Senator Pirelli was a member of Garibaldi's army. As a recognition of his remarkable industrial activity he was awarded the distinction of Cavaliere del Lavoro (Knight of Labour). His son, Dr. Alberto Pirelli, as a Milan correspondent remarks, has taken an active part in the management of the business. He is chairman of the Pirelli-General Cable Works, Ltd., and represented Italy at important international conferences, where his knowledge of economic and financial questions was of great value. He was also on the Young and Dawes Reparations committees.

The late Senator G. B. Pirelli

Mr. L. Johnson.—The death occurred on October 20th, at his residence, Bushwood, Leytonstone, E., of Mr. L. Johnson, London manager of the Pulsometer Engineering Co., Ltd., of Reading, with whom he had been associated for thirty years.

Mr. P. Walker.—We regret to record the death of Mr. Percy Walker, M.I.E.E., former general works manager of Callender's Cable and Construction Co., Ltd., which occurred at Torquay on October 15th. Mr. Walker, who obtained his early training with Manlove, Alliott & Co., of Nottingham, and spent some years as an engineer on board the ships of the Australian Steam Navigation Co., at Sydney, entered the service of the Callender Cable Company when it began the manufacture of bitumen cables at Erith, and was instrumental in the development of the works until he retired in 1925. He was a quiet and unassuming man, and on his retirement received a presentation from over 1,500 of the employés.



The late Mr. P. Walker

Will.—Mr. D. E. James, until recently managing director of the Swansea Improvements and Tramways Co., and the Mumbles Railway & Pier Co., left £12,828 (net personalty £9,554).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Birmingham Sound Reproducers, Ltd.—Private company. Registered October 22nd. Capital £2,500 in £1 shares. Objects: To acquire the business of electrical reproducers carried on by Birmingham Sound Reproducers at Claremont Works, Old Hill, Staffs, to adopt an agreement with D. McDonald, and to carry on the business of manufacturers of gramophones, electrical reproduction and wireless apparatus, &c. The first directors are: D. McDonald, Perry Park Road, Blackheath, near Birmingham; and W. H. Lovall, Lane End, Dunchurch, near Rugby. Secretary: W. H. Lovell. Registered office: Claremont Street, Old Hill, Staffs.

Birmingham Electrical Accessories Co., Ltd.—Private company. Registered October 20th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical plant and accessories, wholly or partly made of metal, porcelain, "Bakelite" or similar material, &c. The directors are: H. Trevena, 33, Balmoral Road, Erdington, Birmingham; C. Glover, 72, Knightlow Road, Harborne, Birmingham, and F. C. Finney, "Merrivale," Hanford, Stoke-on-Trent. Solicitors: Alcock & Abberley, Burslem.

C. & E. Marquis, Ltd.—Private Company. Registered October 19th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in all kinds of electrical and other instruments, &c. The directors are: C. Marquis and Mrs. Esther Marquis, both of 35, Armitage Road, Golders Green, N.W.11. Registered office: 9, Farringdon Avenue, E.C.1.

J. & M. Stone, Ltd.—Private company. Registered October 19th. Capital, £100 in £1 shares. Objects: To carry on the business of retail and wholesale merchants, manufacturers, importers and exporters of and agents for electrical instruments and accessories, &c. The directors are: L. H. Sayer, 301, Chingford Road, E.17; and C. Lawrence, 137, Minories, E.C.3. Secretary: L. H. Sayer. Registered office: 39, Cheapside, E.C.2.

Orr Radio, Ltd.—Private company. Registered October 19th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in radio, electrical and mechanical apparatus, &c. The directors are: W. J. Dwyer, Elmville, Rushbrooke, Co. Cork; and T. Griffith, 28, Crescent Road, Crouch End, N.8.

Neo-Mystic Signs, Ltd.—Private company. Registered October 21st. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in all kinds of signs and indicators, general, electrical and wireless engineers, and to acquire the registered trade mark "Neo Mystic." The permanent directors are: J. W. Dyster, Rosebank, Little Bury Street, N.9, and A. B. E. Cheeseman, 32, Museum Chambers, W.C.1. Registered office: 70, Finsbury Pavement, E.C.2.

Scott Radio, Ltd.—Private company. Registered October 22nd. Capital £500 in 1s. shares. Objects: To carry on the business of traders in wireless materials, sets and accessories, mechanical, electrical consulting and experimental engineers, &c. The directors are: E. Cohn, 16, Grenville Place, S.W.7; and two others. Registered office: 12, Hill Road, Wimbledon, S.W.

Returns of Electrical Companies

E. K. Cole, Ltd.—Debenture charged on deeds and documents relating to premises in Southend-on-Sea, Prittlewell, and Eastwood, Essex, hire-purchase agreements, insurance policies, and the company's undertaking and other property, present and future, including uncalled capital, dated October 11th, to secure all moneys due or to become due from the company to Lloyds Bank Ltd.

D. R. & L. R. Williams (Electrical Contractors), Ltd.—Particulars filed of £150 debentures, authorised October 10th, charged on the company's property, present and future, including uncalled capital, the whole amount being now issued.

East Anglian Electric Supply Co., Ltd.—Capital, £450,000 in 40,000 preference and 410,000 ordinary shares of £1 each. Return dated June 1st, 1932. 2,581 preference and 310,000 ordinary shares taken up. £273,419 paid on 122 preference and 273,297 ordinary shares. £39,162 considered as paid on 2,459 preference and 36,703 ordinary shares. Mortgages and charges, nil.

Reason Manufacturing Co., Ltd.—Capital, £52,500 in 200,000 preference and 10,000 ordinary shares of 5s. each. Return dated March 16th, 1932. 161,260 preference and 10,000 ordinary shares taken up. £19,664 5s. paid on 78,657 preference shares. £23,150 15s. considered as paid on 82,603 preference and 10,000 ordinary shares. Mortgages and charges: £59,646 (bank overdraft).

E. Goldston, Ltd.—Capital, £2,500 in 2,250 preferred ordinary shares of £1 and 5,000 founders' shares of 1s. each. Return dated July 22nd, 1931 (filed March 10th, 1932). 1,282 preferred ordinary and 5,000 founders' shares taken up. £200 paid on 200 preferred ordinary shares. £1,332 considered as paid on 1,082 preferred and 5,000 founders' shares. Mortgages and charges, nil.

Para Electric Railways & Lighting Co., Ltd.—Capital, £780,000 in 390,000 preference and 390,000 ordinary shares of £1 each. Return dated April 25th, 1932. 325,000 preference and 390,000 ordinary shares taken up. £25,040 paid on 25,000 preference and 40 ordinary shares. £689,960 considered as paid on 300,000 preference and 389,960 ordinary shares. Mortgages and charges: £479,512.

Ilfracombe Electric Light & Power Co., Ltd.—Capital, £50,000 in £5 shares. Return dated May 2nd, 1932. All shares taken up. £50,000 paid. Mortgages and charges, nil.

Hart Accumulator Co., Ltd.—Capital, £200,000 in 20,000 preference and 180,000 ordinary shares of £1 each. Return dated May 26th, 1932. 19,523 preference and 156,708 ordinary shares taken up. £38,411 paid on 7,059 preference and 31,352 ordinary shares. £137,820 considered as paid on the remainder. Mortgages and charges, nil.

John A. H. Hunt, Ltd.—J. Ellison, 46, Cherry Street, Birmingham, was appointed receiver and manager on September 29th, 1932, under powers contained in debentures dated March 19th, 1930, and July 14th, 1931.

Aldersgate Electrical Co., Ltd.—Debenture, dated October 10th, to secure £100 charged on the company's undertaking and

The German Manufacturing and Supply Industries

FOR some years past a firm of Berlin publishers has made a practice of issuing from time to time special publications in the form of quarto pamphlets, which are termed "Special Archives of German Industry," concerning leading joint stock companies, concerns and communities of interests in Germany. Four new pamphlets of this kind have just been published dealing with the Siemens Concern, 1932, the A.E.G. Concern, 1932, the Prussian (State) Electricity Company, and the Berlin Power and Light Company.

To those who are desirous of ascertaining the origin, development and present-day situation of any of the four undertakings in question the pamphlets will no doubt prove of value. Taking for instance the Siemens pamphlet, the reader is first informed of the conversion of the Siemens and Halske Co. from a private to a public company in 1897, and is then given a list of the directors and board of management, together with a brief summary of the different manufacturing works and the nature of the manufactures they produced.

In addition, the manufacturing and other companies in which Siemens and Halske have a share and the amount of this participation are set out. Next is found a record of the company's subsidiary companies, offices or representatives in European countries, North and South America, Asia, Australia and Africa. In connection with the last continent it may be noted that representatives exist even at Addis Abeba, Abyssinia, and at Cairo, Egypt; the latter also covers Arabia, Cyprus, Mesopotamia, Palestine, Transjordania, the Soudan and Syria.

The reader is then presented with a summary of important agreements which exist between Siemens and Halske and German and American companies and with the English firm of Siemens Bros. & Co., Ltd., together with a statement showing the trade syndicates of which the company is a member. Statistics concerning the share capital and loans, including a record of the financial working results in the past few years down to 1931, conclude this part of the pamphlet.

Included in the Siemens pamphlet is a similar survey of the structure, development, works and sphere of interest of allied companies as represented by the Electricity Company (late Schuckert) of Nuremburg, the Siemens-Shuckert Works, the Electric Light and Power Investment Company, of Berlin, the Austrian Siemens-Schuckert Co., the Siemens Constructional Union, &c. As the information respecting these companies follows the same lines as those indicated with regard to Siemens and Halske, there will be no occasion for repeating a summary. For the same reason it will be unnecessary to enter into details in the matter of the second pamphlet which deals with the A.E.G. concern. All that may be usefully said is that, having regard to the extensive ramifications and connections of these two companies throughout the world, it is scarcely surprising that Germany still headed the list in 1931 from the standpoint of the value of the exports of electrical manufactures throughout the world with 35.9 per cent. of the aggregate value of the exports of the eight leading exporting countries.

The pamphlets on the Prussian Electricity Company, of Berlin, and the Berlin Power and Light Company have also been prepared on similar lines to those of the two manufacturing companies. The former, which is practically an undertaking in the hands of the State of Prussia, owns various supply works and is interested in various others, while of the share capital of 155 million marks an amount of 129 millions is in State ownership. The Berlin Power Company was formed in 1931 to take over the works and supply system in Berlin and other generating stations, and the State of Prussia is also interested in this great undertaking which had a total capacity of 691,000 kW in 1931.

In conclusion it should be mentioned that the publications are issued by the Verlag R. and H. Hoppenstedt, of Berlin, S.W.19, at 3.50 Rm. for the Siemens, 1.80 Rm. for the A.E.G., 1.80 Rm. for the Prussian Electricity Co., and 2.20 Rm. for the Berlin Power Company pamphlets.

property, present and future, including uncalled capital. Holder: R. W. Buckingham, 40/41, Furnival Street, E.C.4.

Alliance Radio, Ltd.—Debenture, dated September 22nd, to secure £100, charged on the company's property, present and future, including uncalled capital. Holder: W. F. Harwood, 17, Grange Gardens, South Norwood.

George Nobbs, Ltd.—Debenture dated October 4th, to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: C. G. Nobbs, 87/89, Cleveland Street, W.1.

W. T. Glover & Co., Ltd.—Capital £214,850 in 100,000 preference and 114,850 ordinary shares of £1. Return dated May 12th, 1932. All shares taken up. £117,000 paid. £97,850 considered as paid. Mortgages and charges, nil.

Richardsons, Westgarth & Co., Ltd.—Capital £700,000 in 350,000 preference and 350,000 ordinary shares of £1 each. Return dated July 12th, 1932. All shares taken up. £700,000 paid. Mortgages and charges, £25,605.

Asea Electric, Ltd.—Capital £5,000 in £1 shares. Return dated June 28th, 1932. All shares taken up. £5,000 paid. Mortgages and charges, nil.

C. J. Ferguson & Sons, Ltd.—Capital £5,000 in 2,500 preference and 2,500 ordinary shares of £1 each. Return dated October 19th, 1932. 2,500 preference and 1,802 ordinary shares taken up. £2,802 paid on 1,000 preference and 1,802 ordinary shares. £1,500 considered as paid on 1,500 preference shares. Mortgages and charges, nil.

Petersfield Electric Light & Power Co., Ltd.—Capital £20,000 in 6,500 preference and 13,500 ordinary shares of £1. Return dated July 15th, 1932. All shares taken up. £20,000 paid. Mortgages and charges, nil.

Fred Dawson & Co., Ltd.—Particulars filed of £2,000 debentures authorised October 12th, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Consolidated Radio Co., Ltd.—Issue on October 5th of £1,000 debentures, part of a series already registered.

Gem Labor Saving Device Co., Ltd.—Satisfaction in full on October 7th of second mortgage debenture dated April 10th, 1931, and registered same date, securing £15,000.

West Sussex Electrical Co., Ltd.—P. W. Moll, 23, Coleman Street, E.C.2, ceased to act as receiver on October 17th.

City Notes

Erinoid, Ltd.—Presiding at the annual meeting on October 25th, Mr. A. Binnie (chairman), in the course of his speech, said that the increase in sales during the early part of the past year, which was reported at the last meeting, was maintained throughout the year, and the business was still going ahead. As a result they had had the largest volume of sales in the history of the company. The profits for the year were about three times the amount for 1931 and exceeded by £14,000 the average profits for the past fifteen years. In fixing the rate of dividend at 10 per cent. they had to take into account the increase in business and the need to preserve ample liquid capital for future development and also for additional working capital in the event of a rise in prices.

Joseph Lucas, Ltd., held their annual meeting on October 25th. Ald. H. J. Sayer (chairman), who presided, in the course of his speech, said the year under review had been satisfactory. They were able to report a step upward again, and not only was last year's dividend maintained, but there was an increased profit, and they had made rather more adequate allocations to reserve. They had added new lines to their range of equipment, and had increased their turnover by additional products for general trade purposes. They had continued the process of works reorganisation. Both Rotax and C.A.V.-Bosch had made profits during the past year. The present season had opened in a satisfactory manner.

Electrical & Radio Products (1931), Ltd., announces that negotiations have been completed for amalgamation with Edison Bell, Ltd. A new company is being formed called Edison Bell (Great Britain), Ltd., with a capital of £240,000, and it is suggested that shareholders in each company should sub-underwrite 200,000 ordinary shares of £1 each, credited 10s. paid, in Edison Bell (Great Britain), to be offered in due course to the existing shareholders. It is proposed that the amalgamation scheme shall follow immediately after this part of the plan is completed. In addition to its initial capital of £240,000, it is proposed that Edison Bell (Great Britain) shall issue for the acquisition of the business of Electrical & Radio Products 161,000 ordinary shares of £1 each.

The Shawinigan Water & Power Co. has declared a dividend of 13 cents for the final quarter of the current year. A dividend of 12 cents was declared for the quarter ended September 30th. Last year 25 cents were paid per quarter. The net revenue during the nine months ended September 30th was $6,046,000, compared with $6,540,000 during the corresponding period of last year. The surplus for the nine months, before allowing for depreciation and income tax, was $2,438,000 (against $3,557,500).—*Reuter* (Montreal).

The Ever Ready Company (Gt. Britain), Ltd., has declared interim dividends at the rate of 10 per cent. per annum on the preference shares and 10 per cent., actual, on the ordinary shares (increased capital). The directors announce a substantial increase in the sales from April 1st last, as compared with the corresponding period of 1931.

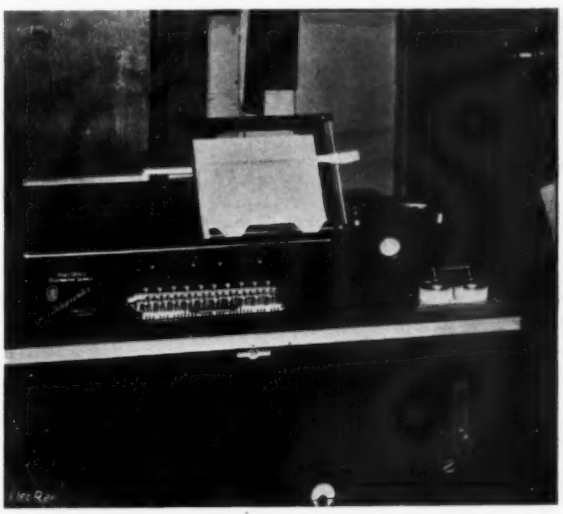
Electric & Musical Industries, Ltd., in its first report covering the period April 20th, 1931, to September 30th last discloses a net profit of £16,115. Of this the preference dividend for the half-year ended December 31st last took £13,800, leaving £2,315 to be carried forward. The preference dividend due in July remains unpaid, and the directors are unable to recommend any further dividends in respect of the period covered by the accounts.

The Power Corporation of Canada reports net earnings for the year ended June 30th of $1,494,817, as against $2,924,693. Interest charges absorbed $828,556, leaving a surplus for the year of $666,261, which, with the surplus brought forward, makes $4,197,823. After providing for preferred and common dividends and a loss on the sale of securities, a surplus of $1,810,382 is carried forward.

The Telephone Co. of Pernambuco, in its report for the year ended December 31st last, states that there was a net loss of £9,746, from which is deducted a credit balance brought forwards of £4,593, leaving a debit balance to be carried forward of £5,153.

The City of Buenos Ayres Tramways Co. (1904), Ltd., has declared a dividend of 1s. 3d. per share (same), being at the rate of 5 per cent. per annum, less tax, for the three months ended September 30th.

Herbert Morris, Ltd., report a profit for the year to July 31st of £66,638, as against £27,075 in 1930-31, to which is added other income (£7,158) and £37,011 brought in, making £110,807.



One of the first teleprinter installations in the Manchester district has been installed at the Trafford Park works of the Metropolitan-Vickers Electrical Co., Ltd. The compact nature of the equipment can be judged from the above illustration

It is proposed to pay an ordinary dividend of 10 per cent. (against nil), to place £10,000 to reserve, and to carry forward £41,773.

Glenfield & Kennedy, Ltd., have declared an interim ordinary dividend of 2 per cent. (against 4 per cent.).

Electrical Components, Ltd.—The company's nominal capital has been increased by the addition of £40,000 in £1 ordinary shares beyond the registered capital of £20,000.

Sir William Arrol & Co., Ltd., state that the dividend for the half-year to June 30th last on the preference shares will be paid on October 31st.

Stocks and Shares

Tuesday Evening.

RATES of exchange have assumed an unexpectedly important position in the Stock Exchange markets concerned with investment securities. The Equalisation Fund which was established a few weeks ago by the Government apparently suspended its operations in order to allow the American exchange to find its own level. The result was the value of the dollar suddenly shot ahead. This had the effect of casting a cloud upon British gilt-edged securities, and at the same time of bringing into prominence the shares of all such companies as those connected, directly or indirectly, with gold, the metal. Victoria Falls Electric Power shares, for example, felt the favourable influence, and the prices rose 6s. 3d. to 4⅞. American utilities, which would have advanced in the ordinary course of events owing to the fall in sterling, are swayed more by the political factors which are now agitating the United States, and prices are not much changed. The recent speech of the Chancellor of the Exchequer, in which he definitely ranged himself on the side of the optimists as regards the outlook for trade, proved a helpful influence in maintaining values amongst industrial shares. Business in the Stock Exchange is by no means bad, although it may be described as patchy; that is, one day may produce a good deal of trade, while on the next there will be nothing doing. A sharp fall in gilt-edged stocks was succeeded, on the Tuesday in this week, by an equally abrupt recovery.

The Two Authorities

The 4½ per cent. debenture stocks of the electricity authorities are steady at 104 for Central Electricity, and 107 for London and Home Counties. To meet the annual interest on the London and Home Counties debt £120,000 is required. For the first three months of the current year, there was nearly £38,000 towards this, and last year the profits were at the rate of £148,000 per annum. The Central Electricity Board is in a slightly different position. The Authority depends

for its earnings mainly upon the success of the grid system. The power supplied by the latter is utilised in substitution for that previously distributed by uneconomic power stations. The price to be paid by the distributing company may not be higher than that at which electric power was formerly produced. The stocks of neither authority are included in the lists of those eligible for trustee investment, although it is frequently urged, and reasonably enough, that from the security point of view they are better than a good many of the stocks which enjoy the distinction conferred upon them on this account.

Gilt-edged Railway Stocks

Other gilt-edged stocks are firm. District 6 per cent. debenture has risen 2 to 147½. Dealings started on Monday in this week in the recently issued 4 per cent. debenture stock of the Southern Railway Company, for which there was heavy over-subscription, in spite of the issue price being as high as 100. Apparently a fair proportion of the amount was written for by stags, with the result that the price opened on the basis of a small discount, but rallied to its par price.

Home Electricity Supply

Something of a halt has been called to the advances which have been occurring week by week in the prices of Home electricity supply shares. County of London ordinary went back to 50s., showing a fall of a florin. Metropolitans dropped to 48s. 9d. On the other hand, City "Lights" are better at 43s. 9d.

The Provincial group is firm, the principal rise being that of 2s. in Northamptons, this taking the price to 49s. 6d. The improvement is due to attention drawn to the favourable prospects that lie ahead of the company. Bournemouth and Poole continue their advance, and are again 9d. higher at 72s. Some of the preference shares are wanted, and North Eastern sevens strengthened, under this demand, to 31s., the ordinary being ⅛ down to 27s. 6d. British Power and Light preference remain at 24s. 9d., the ordinary shares being a little better at 15s. 6d. West Gloucestershire 6½ per cent. participating preference has gone back to 93, a fall of 2 points. Of the foreign shares, Whitehall Electric Investments 7½ per cent. preference advanced to 17s. 6d.

Home Railway Stocks

The rises which took place last month in Metropolitan consolidated ordinary have been followed by a little profit-taking, and the price relapsed 3 to 62. Some of the sellers exchanged their stock for District ordinary, with the result that the latter advanced to 64½. The prices of the two stocks had been running neck and neck for some time, but at the moment, Districts stand 2½ higher than Metropolitans. Underground Electrics retain their rise at 18s. 6d. London Electric Railway ordinary stock has risen 2 to 63½. No alterations have occurred in the prices of the tramway issues.

Cables and Wireless

The market in Cables and Wireless stocks has shown a better tendency. The bout of profit-taking which followed upon the rises in the preference and the "A" ordinary stocks has been succeeded by a fresh accession of purchases. The preference rose a point to 75½. The ordinary stock at 27 is 1 lower. The rise in the price of gold appears to be the attraction to the bulls of the preference stock, by reason of the anticipations felt in regard to the outlook of the Madrid Conference. Globe ordinary are ½ easier at 10½. American Telephone and Telegraph, after a rise of 5 points to 157, went back to 150, and rallied to 153½. Internationals at 14½ show a modest advance. In the Eastern group, Oriental Telephones at 58s. 9d. have gained 3/16. A gain of 7½d. lifted Telephone Manufacturing to 4s. 6d. and Telephone Rentals hardened to 5s. 7½d.

Dollar Stocks

The uncertainty felt as to the result of the forthcoming presidential election in the United States is responsible for spasmodic fluctuations in the prices of American issues of various descriptions. At the moment, the political pointer is thought to indicate that the better chance rests with Mr. Roosevelt and his Democrats. The Republican Party, of which Mr. Hoover is the head, stands conventionally for security and stability. The election takes place on November 9th. Prices of American utilities go up and down in erratic fashion day by day, rendering it almost valueless to quote what they may happen to be at a particular moment. Consolidated Gas and Electric of Baltimore put on 5 points at 95½. Shawinigan Water is practically unchanged at 17½ xd. Power Corporation of Canada shares at 13½ are ½ up. A good deal of interest is being taken in Hydro-Electrics, the fluctuations in price being determined more by Brussels than by New York. From 9, the price fell back to 8¼. International Holdings shares, which follow Hydro-Electrics in their course, are quoted at 1½. Pennsylvania Water are 4½ higher at 74½, and Canadian General preferred at 75½ have risen 2.

Manufacturing and Equipment

The market for shares in this group is firmer. Rises have taken place in Callender's, British Insulated, Enfield Cables, Henley's and Siemens. Even Brush ordinary came into demand, the price showing a rise of 3 at 35. Ever-Ready shares improved to 28s. 9d. on maintenance of the usual interim dividend. Babcock & Wilcox recovered 1/8 to 40s., after the fall caused by the dividend disappointment. Other shares connected with the iron and steel industry are steady. The rubber market is very dormant.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Oct. 25	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies.						
Bournemouth and Poole	1	15	15	72/-	+1	4 3 4
Brompton Ordinary	1	8½	8½	31/-	-	4 10 4
Central Electricity 4½% Deb.	Stock	4½	4½	104	-	4 6 7
Charing Cross Ordinary	1	8½	8½	32/-	-	4 7 6
Chelsea	1	8½	8½	31 6	-	4 9 0
City of London	1	10	10	43/9	+⅛	4 11 6
Clyde Valley	1	8	7	32/6	-	4 6 2
County of London	1	11	10½	50/-	-2/-	4 4 0
Edmundsons' 7% Pref.	1	7	7	29/6	-	4 15 0
Elec. Dis. Yorkshire	1	9	9	41/3	-	4 7 4
Elec. Supply Corporation	1	11	11	55/-	-	4 0 0
Kensington Ordinary	1	8	8	32/6	-	4 6 2
Lancs. Light and Power	1	6½	7	29/6	-	4 15 0
London & Home Counties 4½% Deb.	Stock	4½	4½	107	-	4 4 1
London Electric	1	9	9	32/-	-	4 7 6
Metropolitan	1	10	10	48/9	-⅛	4 2 0
Midland Counties	1	7	7	33/9	-	4 3 0
Mid. Elec. Power	1	8	8	35/9	-6d.	4 9 5
North Eastern Electric Ordinary	1	6	6	27/6	-⅛	4 7 3
Do. 7% Pref.	1	7	7	31/-	+6d.	4 10 4
Northampton	1	10	10	49/6	+2/-	4 1 0
Notting Hill 6% Pref.	10	6	6	12½	-	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/6	-	4 4 3
St James and Pall Mall	1	8	8	31/-	-	4 10 4
Scottish Power	1	8	8	33/9	-	4 14 10
South London	1	8½	8½	33/-	-	4 4 10
Urban Ordinary	1	7	7	35/-	-	4 0 0
Westminster Ordinary	1	8½	8½	31/6	-	4 9 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	+⅛	8 11 6
Yorkshire Elec.	1	8	8	40/-	-	4 0 0
Home Rails.						
Central London Ord. Assented	Stock	4	4	81½	-	4 18 2
Metropolitan	,,	3½	2½	62	-3	4 0 8
Do. District	,,	5	4½	64½	+1	6 19 6
Underground Electric	1	8	7	18/6	-	7 11 4
Telegraph and Telephones.						
American Tel. & Tel.	$100	9	9	153½	+1	5 17 3
Anglo-Am. Tel. Pref.	Stock	6	6	104½	-	5 14 10
Do. Def.	,,	1½	1½	26	-	5 15 5
Cables & Wireless 5½% Pref.	,,	5½	2½	75½	+1	3 13 10
Do. A 7½% Ord.	,,	—	Nil	27	-1	—
Do. B ord.	,,	—	Nil	13	-	—
Globe Tel. and T. Ord.	10	8½	Nil	10½	-½	—
Do. do. Pref.	10	6	6	11½	-	5 4 4
Great Northern Tel.	10	20	20	26	-	7 13 10
Marconi-Marine	1	15	10	31/3	-	6 8 0
Oriental Telephone Ord.	1	12	12	2 3/16	+3/16	*4 1 8
Home and Foreign Trams, etc.						
Anglo-Arg. Trams First Pref.	5	—	—	5/-	-	—
Do. do. 2nd Pref.	5	—	—	3/9	-	—
Do. do. 5% Deb.	Stock	—	—	7	-	—
British Electric Traction Def. Ord.	,,	5	5	300	-	—
Do. do. Pref. Ord.	,,	8	8	133½	-	5 19 10
Brazil Traction	100	—	—	12½	+½	—
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	100½	-	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	10/-	-	—
London United Tram Deb.	Stock	4	4	62½	-	6 8 0
Mexico Trams, 5% Bonds	—	5	5	45	-	11 2 2
Mexican Light Common	100	Nil	Nil	12½	-	—
Do. 7% Pref.	100	7	7	20	-	—
Do. 1st Bonds	—	5	5	69½	+4	7 11 10
Victoria Falls Ord.	1	15	15	81/3	+⅛	3 14 0
Yorkshire (West Riding)	1	Nil	Nil	5/-	-	—
Manufacturing Companies.						
Assoc. Elec. Ord.	1	6	4	18/3	-	4 7 8
Do. Pref.	1	8	8	30/-	-	5 6 8
Babcock & Wilcox	1	14	14	40/-	+⅛	—
British Aluminium Ord.	1	10	5	27/6	-	3 12 9
British Insulated Ord.	1	15	15	67/6	+⅛	4 9 4
Brush Ord.	Stock	5	Nil	35	+3	—
Callender's	1	15	15	3½	+⅛	4 15 10
Do. 6½% Pref.	1	6½	6½	27/6	-	4 14 6
Crompton Parkinson Ord.	5/-	30	24	21/3	-	5 13 0
Do. 8% Pref.	1	8	8	30/-	-	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	23/3	-	6 9 0
Do. 5% Deb.	Stock	5	5	100	-	5 0 0
Electric Construction	1	Nil	Nil	8/9	-	—
Enfield Cable Ord.	1	25	25	4½	+⅛	5 11 1
English Electric	1	Nil	Nil	10/9	-	—
Do. do. Pref.	1	Nil	Nil	13/9	-	—
Ever Ready	5/-	35	35	28/9	+6d.	6 1 9
Ferranti Pref.	1	7	7	24/-	-	5 16 8
G.E.C. Pref.	1	6½	6½	28/-	-	4 12 10
Do. ord.	1	10	8	41/3	-	3 17 6
Henley's	1	30	30	6½	+⅛	4 17 10
Do. 4½ Pref.	5	4½	4½	5½	-	4 5 9
India-Rubber	1	Nil	Nil	3/9	-	—
Johnson & Phillips	1	10	5	1⅛	-	4 4 2
Siemens Ord.	1	7½	7½	26/3	+6d.	5 14 3
Telegraph Construction	12	Nil	Nil	11	-	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

18126. "Electrolytic cells." H. E. Potts (Hooker Electrochemical Co.). June 23rd, 1931. (381183.)

18254. "Electric traction system." R. Rouge. June 25th, 1930. (381157.)

18335. "Electric lamp standards." W. H. Sturge. June 25th, 1931. (Cognate application 20385/31.) (381159.)

18402. "Electric relay systems for marine, aircraft, and similar purposes." L. W. Williams. June 25th, 1931. (381202.)

18411. "Methods of and apparatus for uniting leading-in wires to the base pins of radio-tubes and the like." British Thomson-Houston Co., Ltd. June 25th, 1930. (381203.)

18581. "Radio-receiving apparatus." A. V. Tomlinson. (Union Switch & Signal Co.). June 26th, 1931. (381206.)

18751. "Plug-and-socket connectors, switches, fuses, and the like." C. L. Arnold and M.K. Electric, Ltd. June 29th, 1931. (381178.)

19024. "Sound recording or reproducing apparatus." Electrical Research Products, Inc. April 10th, 1931. (381214.)

19198. "Electric sound signals." L. J. F. Austin. July 3rd, 1931. (Cognate application 29450/31.) (381227.)

19268. "Two-way signalling systems comprising electrically long transmission lines." Electrical Research Products, Inc. July 9th, 1930. (381232.)

19269. "Thermionic valve circuit arrangements." Electrical Research Products, Inc. July 9th, 1930. (381233.)

19456. "Vacuum electric tube devices." E. Y. Robinson and Associated Electrical Industries, Ltd. July 6th, 1931. (381242.)

19802. "Clamps for electric conductors and the like." C. S. Garland. July 9th, 1931. (381247.)

20196. "Television, photo-telegraphic, and like systems." J. C. Wilson, and Baird Television, Ltd. July 14th, 1931. (381254.)

22515. "Electric relays." L. Mellersh-Jackson (Vereinigte Eisenbahn-Signalwerke Ges.) August 8th, 1931. (381278.)

25224. "Picture telegraph and television systems." Marconi's Wireless Telegraph Co., Ltd. September 25th, 1930. (381306.)

26546. "Tanks for electrolysis." J. P. Leemans, and Soc. Générale Métallurgique de Hoboken. September 23rd, 1931. (381318.)

26937. "Fittings for the overhead contact conductors of electric traction systems." British Insulated Cables, Ltd., and J. W. Astley. September 28th, 1931. (381321.)

27027. "Loud speakers." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. July 28th, 1931. (381322.)

28405. "Insulating wires and other electrical articles." British Celanese, Ltd. October 13th, 1930. (381340.)

29245. "Protective arrangements for electric power supply systems or apparatus." General Electric Co., Ltd., and W. Wilson. October 21st, 1931. (381349.)

29279. "Devices for the adjustment of receiving sets for wireless waves." J. L. Routin. November 5th, 1930. (381350.)

29680. "Electrical joint coupling or connection." Macintosh Cable Co., Ltd., A. Sargent, and T. Elder. October 26th, 1931. (381354.)

29,698. "Insulating wires and other electrical articles." British Celanese, Ltd. October 25th, 1930. (381355.)

29756. "Trolley inspection platform for electrically propelled vehicles." English Electric Co., Ltd., and P. E. Warner. October 27th, 1931. (381357.)

30201. "Means for use in repairing electric cables." C. J. Beaver, T. J. Fairfield, and W. T. Glover & Co., Ltd. October 31st, 1931. (381366.)

31290. "Cable connectors, in particular for use with sparking plugs." Siemens & Halske Akt.-Ges. November 21st, 1930. (381375.)

31398. "Electric signalling or control systems." Siemens and Halske Akt.-Ges. December 18th, 1930. (381376.)

33446. "Thermionic valve holder and like metal tubular sockets." C. E. Every-Clayton (D. Gottlieb). December 2nd, 1931. (381393.)

33656. "Slide-rule for electrical engineers." L. F. Gardner (A. W. Faber Castell-Bleistift-Fabrik Akt.-Ges.). December 4th, 1931. (381395.)

35825. "Electric lamps for lighting." W. G. Gold and W. Bayliss, Ltd. December 28th, 1931. (381411.)

35937. "Quick-action electric switches." M. H. Goldstone, and Ward & Goldstone, Ltd. December 30th, 1931. (Patent of addition not granted.) (381414.)

36066. "Electric-lamp holders." S. Heath & Sons and A. E. Mason. December 31st, 1931. (381416.)

1932

205. "Arc-quenching devices for electric circuit breakers." G. R. Shepherd (Westinghouse Electric & Manufacturing Co.). January 4th, 1932. (381419.)

497. "Electric incandescent lamps or discharge tubes." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). January 7th, 1932. (381420.)

2412. "Electronic discharge valves." Telefunken Ges. für Drahtlose Telegraphie. January 27th, 1931. (381432.)

2569. "Electrical water-heating receptacles." J. H. Walker (S. Le F. Varvel). January 28th, 1932. (381434.)

5225. "Distribution systems for wireless receivers." J. W. Field and J. E. Ball. February 22nd, 1932. (381449.)

5570. "Holders for the electrodes of arc lamps." Zeiss Ikon Akt.-Ges. February 26th, 1931. (381452.)

5927. "Method of reducing electrical disturbances in telephone and like lines." Siemens & Halske Akt.-Ges. February 28th, 1931. (381453.)

6407. "Cathode-diaphragms of electrolytic cells." H. E. Potts (Hooker Electro-Chemical Co.). June 23rd, 1931. (Divided application on 381183.) (381190.)

8005. "Electric wave filters, particularly for high-frequency transmitting installations." C. Lorenz-Akt.-Ges. April 2nd, 1931. (381477.)

9022. "Electric switches with arc-extinguishing chambers." International General Electric Co., Inc. March 27th, 1931. (381484.)

9025. "Methods of generating high-frequency electrical energy." Compagnie Générale de Télégraphie sans Fil. April 13th, 1931. (Addition to 7129/32.) (381485.)

9813. "Thermionic valves or electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 18th, 1931. (381491.)

10358. "Electric condensers." International General Electric Co., Inc. April 11th, 1931. (381494.)

11107. "Illuminating lamps." J. Pintsch Akt.-Ges. December 10th, 1931. (381495.)

11709. "Apparatus for the transmission to a distance of measured magnitudes, more especially of those of electricity meters." Landis & Gyr Akt.-Ges. May 11, 1931. (381499.)

11851. "Electrode for electric melting furnaces." A. Cornelius. April 25th, 1932. (381500.)

11930. "Jointing-caps for electrical conductors." Naamlooze Vennootschap Electriciteits Maatschappij Electrostoom. April 29th, 1931. (381501.)

12179. "Method of equalising capacity-difference in multiconductor telephone cables." Deutsche Kabelwerke Akt.-Ges. May 5th, 1931. (381502.)

12911. "House telephone apparatus." H. Herr. July 22nd, 1931. (381505.)

13732. "Means for protecting electric circuits." British Thomson-Houston Co., Ltd. May 12th, 1931. (Addition to 274070.) (381510.)

14554. "Telephone-call registering apparatus." O. Weber. May 23rd, 1931. (381513.)

16007. "Rontgen tube holder, proof against high tension and radiation." Siemens-Reiniger-Veifa Ges. für Medizinische Technik. July 8th, 1930. (Divided application on 18885/31.) (381191.)

20641. "Apparatus for obtaining connections in automatic telephony systems." A. Boye. July 30th, 1931. (381532.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from October 19th :—

Elozo. No. 533900. Class 6. Decarbonising apparatus for internal combustion engines.—Watson's Electrical Decarboniser, Ltd., 28, Grosvenor Place, S.W.1.

Krexo. No. 531872. Class 8. Instruments and apparatus and parts thereof for use in radio-telephony and telegraphy, sound-reproducing and recording, and radio apparatus in combination with gramophones.—Frederick G. Woodall, 20, Union Street, St. Helier, Jersey (Gee & Co., 51-52, Chancery Lane, W.C.2).

Univolt. No. 532829. Class 8. Radio-gramophones, pick-ups, &c.—Betta Electric Motors, Ltd., Balfour House, 119, Finsbury Pavement, E.C.2.

Sunbeam. No. 533663. Class 8. Built-up radio receiving sets.—David Rich, 310, Queen's Road, Upton Park.

Jupiter. No. 534291. Class 8. Instruments and apparatus and parts thereof for use in radio-telegraphy and telephony.—Sovereign Products, Ltd., 52-54, Rosebery Avenue, E.C.1.

Three Spires. No. 534,890. Class 8. Radio-telephonic apparatus, television apparatus, in combination with gramophones, and parts thereof.—C. J. Robey, Ltd., 203-269, Foleshill Road, Coventry.

Atlas (lettering and design). No. 534230. Class 13. Electric lamps (ordinary).—Star Lamp Manufacturing Co., Ltd., Africa House, Kingsway, W.C.2.

Solume. No. 535009. Class 13. Electric lamps (ordinary).—E. Sexton, Rugby Chambers, Great James Street, W.C.1.

The Heating of Buildings

For some years the Department of Scientific Industrial Research has been studying the efficiency of buildings from the standpoint of the user, a study which includes the heating and ventilation and the acoustics of buildings. It has been shown, for example (1) that where free ventilation is required radiant heating is relatively advantageous, (2) that some rooms are difficult to warm by reason of the nature of the fabric of their walls. In connection with such investigations it was observed that the physiological aspects of comfort are as yet imperfectly understood, and reasons have been sought in explanation of such a fact that two rooms are not equally comfortable when a thermometer shows the same reading in each.

For accurate work in the investigations of the Building Research Board and the Industrial Health Research Board, physiological sensations must be interpreted in terms of physical quantities capable of exact measurement. A new criterion of the thermal comfort of an environment, the equivalent temperature, put forward by Mr. A. F. Dufton of the Building Research Station, has received the approbation of an interdepartmental committee set up by the Medical Research Council and the Department of Scientific and Industrial Research.

This scale of equivalent temperature is discussed in a technical paper, "The Equivalent Temperature of a Room and its Measurement," just published by the Department of Scientific and Industrial Research, H.M. Stationery Office, price 6d.

A full description of the instrument for recording equivalent temperature, the eupatheoscope (ELECTRICAL REVIEW, August 22nd, 1930, page 319) is also given. We understand that the contents of the paper are similar to those of Mr. Dufton's paper, read at the summer meeting of the Institution of Heating and Ventilating Engineers last year (ELECTRICAL REVIEW, July 10th, page 57).

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Reconstruction of Electric Theatre (special lighting at front); manager.

Acton.—Flats (43), near Broadway; J. E. Adamson, architect.

Ashby-de-la-Zouch.—Houses (112); R.D.C. surveyor.

Audenshaw (Manchester).—Houses (42), Audenshaw Hall Estate; W. T. Crossman.

Barking.—Two schools, Becontree; C. J. Dawson, architect, Clock House Chambers.

Barnsley.—Rehousing scheme; borough surveyor. Greyhound racing track, Queen's Ground Sports Stadium, Ltd.

Beadnell (NORTHUMBERLAND).—Development, Craster Estate; Hicks & Charlewood, architects, Mosley Street, Newcastle.

Bexhill.—Building estate off Turkey Road, for H. Earl; L. McCormick.

Bideford (DEVON).—Isolation hospital (£14,000); Orphoot, Whiting & Bryce, architects, 1, John Street, Bedford Row, London, W.C. Houses (42), Sentry Corner Estate; borough surveyor.

Birmingham.—Factory, Bailey Street and Steelhouse Lane; C. Bryant & Son, builders, Small Heath. Factory, Digbeth; J. Moffatt & Sons, builders, South Road, Camp Hill.

Blyth.—Houses (200), Plessey Road; L. Leeper, borough engineer, Municipal Buildings.

Bootle.—Church, Alexandra Drive; Catholic trustees. Houses, Southport Road; Lloyd & Cross, Ltd., Birkenhead (37), and North Western Estates Development, Ltd. (34).

Bradford.—Houses (40) and shops (4), Park Road, Thackley; J. W. Walker.

Brighton.—School, Patcham; director of education.

Brownhills (STAFFS).—Houses (50), for U.D.C.; Norman Waine, clerk.

Bury (LANCS).—Houses (164); borough engineer.

Carlisle.—Houses (30), Shaddongate area; city engineer. Hotel, Botchergate; H. E. Scarborough, architect. Operating theatre, Cumberland Infirmary (£9,000); S. W. B. Jack, architect, Lloyds Bank Chambers.

Cheshire.—School (300 places), Sale; director of education, Chester.

Chester.—Hotel, Blacon-Saughall Road, for Best's Brewery Co., Ltd., Johnson Street, Liverpool; J. H. Davies & Son, architects, 14, Newgate Street.

Cleadon.—Houses (353), for Sutton trustees; C. S. Errington, architect, Newcastle.

Colchester.—Houses (100); city surveyor.

Colwyn Bay.—R.C. schools; priest-in-charge.

Coventry.—Technical college, The Butts (£76,400); education architect. Isolation hospital (£123,500) for the T.C.; Stanley Atkinson (Wimperis, Simpson & Guthrie), architect, 61, South Molton Street, London, W. Houses (about 1,000), Canley Estate; city engineer.

Cramlington (NORTHUMBERLAND).—Houses (42); U.D.C. surveyor, Council Offices.

Croydon.—Extensions, Mayday Road Hospital (£97,000); borough engineer.

Darlington.—Greyhound racing track, Chestnut Grove; J. Clayton, architect, High Row Chambers.

Dartford.—Houses (36), Burnham Road; Feakes & Richards.

Dodworth (YORKS).—Houses (26), for the U.D.C.; Dyson, Cawthorne & Coles, architects, 25, Regent Street, Barnsley.

Dumfries.—Extension to High School (£14,000); county architect.

Duns.—Cinema, South Street; M. Burns, Carluke.

Ealing.—Houses (87), Cuckoo Dene, for Tucker & Warren; R. J. Ward, architect, 107, Uxbridge Road, W.5. Houses (135), Alperton Estate, for W. Smirk & Sons; G. L. Russell, 1, Broad Street Buildings, Liverpool Street, E.C.2. Fire station, &c., for T.C. (£27,200); A. D. B. Hanson, Ltd., contractors, Southall. Houses (33), Huxley Gardens, Park Avenue and Park Close; A. Graham, 135, Torrington Park, North Finchley, N.12.

Easington (Co. DURHAM).—Houses (200); C. W. Clarke, R.D.C. surveyor, Council Offices.

Eastbourne.—Houses (48), Churchdale Road; borough engineer.

Edinburgh.—Factory for Alex Cowan & Sons, Ltd. (£10,000); J. D. Cairns & Ford, architects, 63, George Street.

Faringdon.—Houses (64) for R.D.C.; E. H. Bradley & Sons, builders.

Fifeshire.—Mining school, Cowdenbeath (£20,000); clerk, County Education Committee, Kirkcaldy.

Gateshead-on-Tyne.—Houses (106), Carr's Hill Estate; F. H. Patterson, borough engineer, Town Hall.

Glasgow.—Houses (87), Sunnybank Estate; housing director.

Grangemouth.—Housing scheme (£50,000); borough surveyor.

Greenock.—Reconstruction of La Scala Picture House; W. G. McAulay, proprietors.

Hailsham.—School; East Sussex county surveyor, Lewes.

Hastings.—Electric pumping plant, Brede pumping station (£5,500); water engineer.

Houghton-le-Spring.—Houses (75); V. J. Hunter, U.D.C. surveyor, Council Offices.

Hyde.—Houses (30), Back Bower; borough engineer.

Inverness.—Houses (100), Nethybridge, Portree, and elsewhere; county surveyor, 26, Bank Street.

Irish Free State (LISTOWEL, Co. KERRY).—Houses (104) for the U.D.C.; J. J. Winters, engineer, 27, Molesworth Street, Dublin. (MACROOM, CORK).—Houses (66) for the U.D.C. (COBH, QUEENSTOWN).—Technical school; Cork County E.C. (CORK).—Houses (108), Blarney Street, for the Corporation; J. R. Boyd Barrett, architect, 61, South Mall. Printing works, Smith Street; Murphy Bros., builders. (WATERFORD).—Houses (45), Morrison's Road, for the Housing Committee; D. Sheedy, borough surveyor, 12, The Mall. (ATHY, Co. KILDARE).—Houses (93); D. Heaney, U.D.C. engineer, Thurles, Co. Tipperary. (NEWCASTLE WEST AND HOSPITAL, Co. LIMERICK).—Technical schools for Vocational Education Committee; Sheahan and Clery, architects, Cecil Chambers, Limerick.

Kidderminster.—Sewage scheme, with engines, pumps, &c. (£50,000); borough surveyor.

Kilmarnock.—Houses (90), with electrical work; James Hay and Steel, architects, 13, West George Street.

Lancashire.—School, Leyland; director of education, Preston.

Liverpool.—R.C. church; Rev. John Kieran, 109, Great Mersey Street. Elementary school, Highfield Estate, Broadgreen; land steward and surveyor (Architectural Dept.), Municipal Buildings.

London.—(FOREST HILL).—Extensions, Horniman Museum (£10,000); L.C.C. architect. (KENNINGTON).—Flats, China Walk Estate (£47,000); L.C.C. architect. (LEYTON).—Health clinic and child welfare centre (£7,000) for the T.C.; Stannard & King, builders. (MARYLEBONE). — Tenements, Lilestone Estate (£22,846), for L.C.C.; A. T. Rowley. (STOKE NEWINGTON).—Rehousing scheme, Glebe Place (£50,000); engineer.

Lowton St. Mary's.—Catholic Church, off Newton Road; H. Heaton & Sons, architects, Sankey Street, Golborne.

Macclesfield.—Additional housing scheme, Moss Lane Estate; borough surveyor.

Manchester.—Houses (860), Royal Oak area, Wythenshawe; housing director, Town Hall. Reconstruction of premises, Smithfield Market (£15,500); city architect. Schools (£45,000); city architect.

Mansfield.—Extensions, Harlow Wood Hospital (£14,000); secretary.

Morecambe.—Hotel, Humphreys, Ltd., builders, Knightsbridge, London.

Morpeth (NORTHUMBERLAND).—Mental hospital for C.C. (£180,000); W. W. Tasker, county architect, 17, Claremount Road, Newcastle.

Newcastle-on-Tyne.—Houses (42) and shops, Pretoria Street; F. M. Dryden, architect, 6, Market Street. Houses (80), Delavae Road; F. M. Dryden, architect, 6, Market Street.

Oldbury.—Church, Rood End, Langley; W. H. Giles, architect; Atkinson & Co., builders, West Bromwich.

Orkney.—Reconstruction of Stromness School (£3,500); county clerk, Kirkwall.

Paignton.—Pavilion, The Green (£15,000); U.D.C. surveyor.

Penzance.—Houses (150), Penalverne Estate; borough surveyor.

Poole.—St. George's Church, Oakdale; Rev. C. H. Bellamy, vicar of St. Mary's, Longfleet.

Portsmouth.—Church, Northern Parade, Hilsea; Bishop of Portsmouth.

Preston.—Houses (41), Frenchwood; borough surveyor.

Ramsbottom.—Reconstruction of Royal Cinema; manager.

Reading.—School, Brixham Road; director of education. Development of thirty acres for houses, Whitley Estate, for Hayes Bridge Estates, Ltd.

Richmond (SURREY).—Business stores (£30,000) for Wright Bros.; Brewer, Smith & Brewer, architects; Soole & Son, builders. Flats (108), Richmond Hill; Roy Gibson, Ltd., Broadway House, Church Road, S.W.

Rotherham.—Houses (34), Badsley Moor Lane; A. V. Hopkins.

St. Helens (LANCS).—Houses (80); borough surveyor.

Salford.—Houses (287), Swinton Park Road and Lancaster Road, Pendleton; J. Lane & Sons, Ltd., Morpeth Street, Swinton.

Sanderstead.—Houses (255), Rectory Estate; Harold Williams, Holliday & Partners, Croydon.

Slough.—Houses (200), Langley Road Estate; W. T. Heath, Battersea and Richmond-on-Thames.

South Shields.—Houses, Marsden, for R.D.C. (£15,270); W. D. Allison, builder, Whitburn.

Stirling.—Houses (50), Linden Avenue site; burgh surveyor.

Stockton-on-Tees.—Houses (162); borough surveyor.

Stroud (GLOS).—Houses (50), Uplands; U.D.C. surveyor.

Surrey.—Schools, Ockford Ridge Estate, Godalming, and St. Helier Estate, Morden; County E.C.

Swansea.—School, Gorse Road, for E.C.

Swindon.—Houses (151), off Ferndale Road; A. J. Colborne. Houses (142), Hurst Estate; Alfred Groves & Sons, Ltd., Oxford.

Taunton.—Houses (88) for T.C.; King & Co., Newport (40), and J. Standerwick & Sons, Bridgwater (48), builders.

Thornton Heath.—Shops, railway frontage; Southern Railway.

Tottenham.—Factory, Vale Road; R. Rosenblatt. Houses (45), Waggon Lane area (£22,000); U.D.C. surveyor.

Tranent.—Houses (50); Morham & Brotchie, 29, Hanover Street, Edinburgh.

Waddon.—Houses (144), Housing Estate; Croydon borough engineer. Church, Croydon Corporation Estate; Ecclesiastical Commissioners.

Walsend-on-Tyne.—Houses (84); J. Blench, borough engineer, Town Hall. Houses (120), Bewicke School site, for T.C.; Ball & Thomas, builders, Norton-on-Tees.

West Riding.—Schools, Hoyland Nether and Ferry Fryston; director of education, Wakefield.

West Ward (WESTMORLAND).—Houses (38) for R.D.C.; Messrs. Baines, builders, Sandes Avenue, Kendal.

Weymouth.—Conversion of premises into Institution for the Weymouth and Royal Dorset Eye Infirmary; Sidney Jackson, architect. Development, Faircross Estate; Smith & Lander.

Whickham (DURHAM).—Houses (64), Whickham Lodge; S. J. Stephenson, architect, 2, Saville Place, Newcastle.

Whitby.—Houses (34), Gallows Close Estate; U.D.C. surveyor.

Whitehaven.—Houses (120); borough surveyor.

Winsley (WILTS).—Extensions, sanatorium (£18,380), for the governors; W. S. Skinner & Sons, architects, Bristol.

Witney.—Houses (54); A. T. Green, U.D.C. surveyor. Houses (22), Corn Street, for W. P. Armitage.